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# GLOBAL MALARIA*

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SINCE December, 1941, when the United States entered the present global war, American soldiers have been sent to many parts of the world. Members of our armed forces are now stationed from Greenland's icy mountains to India's coral strand. In these regions, they are exposed to a variety of climates ranging from the extreme cold of the frigid zone to the intense heat of the tropics. They are also exposed to the innumerable infections of these areas, and therefore the Medical Department of the Army must be prepared to fight disease on a global scale. At the present time there is no malady known to man that may not be encountered by American troops, but the most important of all these disease hazards is malaria.

## DISTRIBUTION

The present freedom from malaria of the northern United States and the reduced prevalence of the disease in the South have led to a tendency to underestimate the military importance of this serious infection. This is unfortunate, for even in this country, with its extensive facilities for malaria control, about a million persons are infected each year, and the death rates per 100,000 population have varied from 3.5 in 1935 to 0.9 in 1941.

The United States Army has had a long experience with malaria, in both peace and in war, at home and abroad. Never before, however, has it been faced with exposure to the disease in so many different geographic regions, in each of which the epidemiology differs depending on local mosquito vectors and other factors. Therefore, before indicating our experience with malaria and the scope of the present control program, the epidemiology of malaria from the global aspect will be briefly considered.

It has long been known that malaria is one of the most important diseases of man. Some years ago Manson[1] remarked, "Directly and indirectly it [malaria] is the principal cause of morbidity and death in the tropics and sub-tropics." Osler[2] referred to malaria as "the greatest single destroyer of the human race." Today, more than four decades after the discovery of the means of its transmission by mosquitoes, malaria remains a major scourge, exceeding all others in reducing the vitality and impeding the industrial development and political progress of the inhabitants of many tropical, subtropical and temperate countries.

The exact world prevalence of malaria is not known. From a study reported by the League of Nations in 1932 it was concluded that in sixty-five countries over 17,000,000 cases were treated in one year. Obviously, only a small proportion of the total number of patients are treated. In India, for example, each year only 8,000,000 to 10,000,000 are treated out of a total of about 100,000,000 patients, and of these from 1,000,000 to 3,000,000 die.

The world distribution of malaria is indicated in Figure 1. According to Strong[3] the disease is prevalent between 45° north latitude and 40° south latitude. The indigenous malaria belt extends from 60° N in Europe (Russia and southern Sweden) to 30° S in Africa (Natal), to 40° S in South America (Argentina), and rarely to 20° S in Australia (Queensland).

## EPIDEMIOLOGY

The epidemiology of malaria varies greatly in different parts of the world. In the United States, for example, the most important vector of malaria is *Anopheles quadrimaculatus*. This mosquito breeds by preference in the still, fresh water of pools, lakes and swamps. Naturally, the problem of malaria control here is vastly different from that in Trinidad, where one of the important vectors, *A. bellator*, breeds in water-holding air plants that grow high above the ground on the limbs of immortelle

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trees. There are many other important species in the western hemisphere, each of which has its peculiar breeding habits requiring special methods of control.

The chief vector in West Africa is *A. gambiae*, a domestic mosquito that breeds in any kind of standing water, hoofprints, cart tracks, borrow pits, or marshes and even along the edges of slowly moving streams. This is the African mosquito that, in 1930, was transported to Brazil, where it succeeded in colonizing and where, in 1938, it caused the greatest epidemic of malaria ever known in the Western Hemisphere. Fortunately, owing to an energetic campaign by the Brazilian Government in co-operation with the Rockefeller Foundation, *A. gambiae* has apparently been eradicated from Brazil. However, it still remains a great hazard in large areas of Central Africa from the west coast across to the Nile Valley, and even into Eritrea on the Red Sea.

In India there are a number of important malaria vectors with widely different habits. In Bombay, for example, there is *A. stephensi*, a thoroughly domesticated anopheline that, like the yellow-fever mosquito, *Aedes aegypti*, breeds in wells and in standing water in and around houses. Another important vector in India, and the only one in Ceylon, is *A. culicifacies*. This mosquito breeds primarily in pools and is found in such places as drying river beds, overflow pools, borrow pits, hoofprints and cart tracks, and in slowly running irrigation water. This is a plains mosquito that is not found in the hills above an elevation of 3500 feet. It is interesting to note that this mosquito, which caused the great epidemic in Ceylon in 1934–1935, is also responsible for the great epidemics that have occurred from time to time in the Punjab of northwestern India.

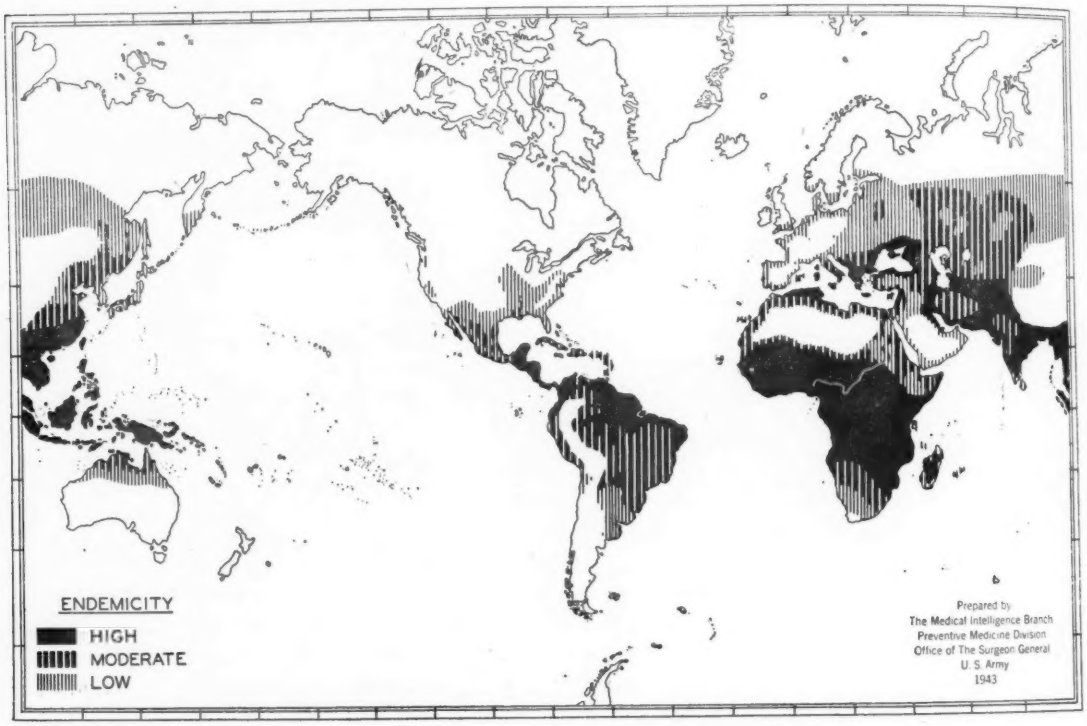


FIGURE 1. *Global Distribution of Malaria.*

Another important malaria vector in India is *A. fluviatilis*, which breeds along the edges of foothill streams and irrigation ditches in southern India. It is not normally found at elevations below 1000 or above 5000 feet. A similar mosquito, *A. minimus*, a sunshine and running-water breeder, occurs in central and northeastern India, northern Bengal, Assam, Burma and South China. This stream-breeding mosquito was responsible for a malarial infection rate of 100 per cent in the Chinese troops who escaped from Burma through Assam into India. Undoubtedly, it is as great a hazard to military operations along the Burma border as are the Japanese themselves.

In the Malay Peninsula the principal vector is *A. maculatus*, which breeds by preference in seepage water. There is also a salt-water breeder in southern Malay and throughout the Dutch Indies

and southern Bengal known as *A. sundaicus*. This mosquito breeds in brackish-water marshes and in fishponds and causes a great deal of malaria.

In the Philippines, malaria is important only in the areas where the vector is *A. minimus* var. *flavirostris*, a shady foothill-stream breeder. It was this mosquito that transmitted malaria in Bataan.

In southern Europe the main vectors are races of the species *A. maculipennis*, which differ markedly in their habits.

There are many islands in the South Pacific where malaria does not exist because of the absence of anopheline mosquitoes (Fig. 2).

These differences in the breeding habits of the anopheline vectors of malaria in different parts of the world create innumerable difficult problems in the military control of the disease, and a careful survey of each situation is required before effective control can be accomplished.

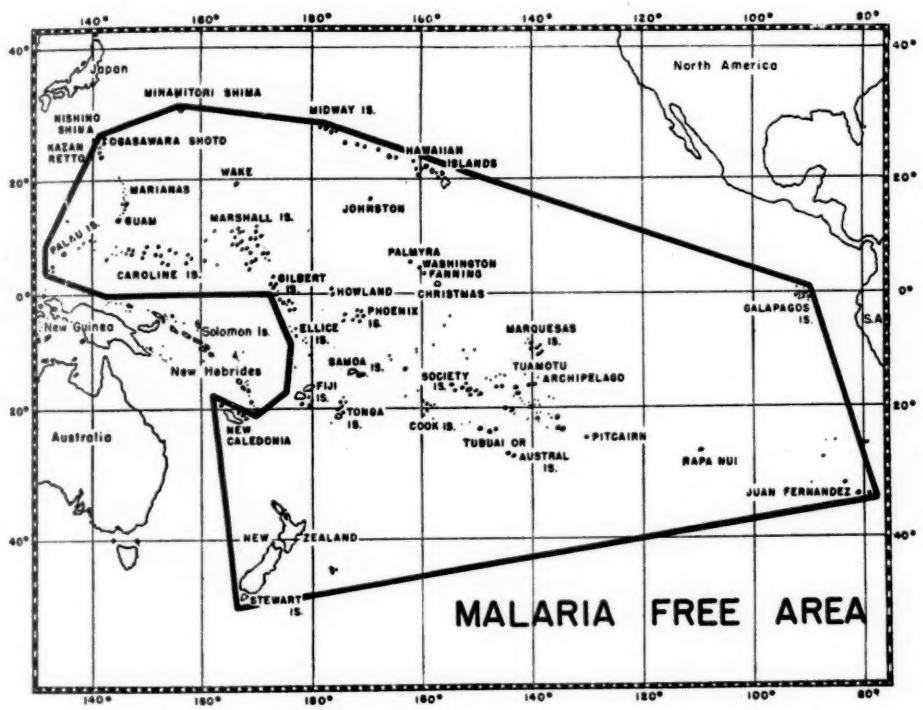


FIGURE 2. *Map Showing the Malaria-Free Area in the South Pacific.*

## THE ARMY'S EXPERIENCE WITH MALARIA

### *Previous Malaria Rates*

The United States Army has always been exposed to malaria. The annual malaria admission and death rates per 1000 population for more than a century are indicated in Figure 3. Before 1900 the rates were extremely high, especially during periods of war. Since that time the development and use of improved control methods have resulted in a satisfying decrease, and for the year 1939 the admission rate for the Army at home and abroad was only 3.8 per 1000.

### *Present Malaria Program*

During 1940, the Surgeon General of the Army took steps to expand and revise the Army's plans for malaria control in order to meet whatever military situations might arise. This control program included the following general measures:

The establishment of the Section on Tropical Disease and Malaria Control in the Preventive Medicine Division of the Surgeon General's Office, which co-ordinates all the Army's antimalaria activities.

The establishment of the Commission on Tropical Diseases, composed of civilian consultants to the Secretary of War, as a part of the Preventive Medicine Division. (Serving on this commission are some of the country's best experts in malaria control.)

The organization of the Subcommittee on Tropical Diseases of the National Research Council to advise the Surgeon General on policies concerning the treatment and control of tropical diseases, especially malaria.

The initiation and co-ordination of a comprehensive research program dealing with malaria

that has been undertaken with the advice of the National Research Council and the approval of the Committee on Medical Research of the Office of Scientific Research and Development, office for Emergency Management. (Many separate institutions are making studies, and many thousands of dollars are being spent monthly in the search for more effective antimalaria drugs; also much valuable research on insecticides and mosquito repellents is being done in close cooperation with the Bureau of Entomology and Plant Quarantine of the United States Department of Agriculture.)

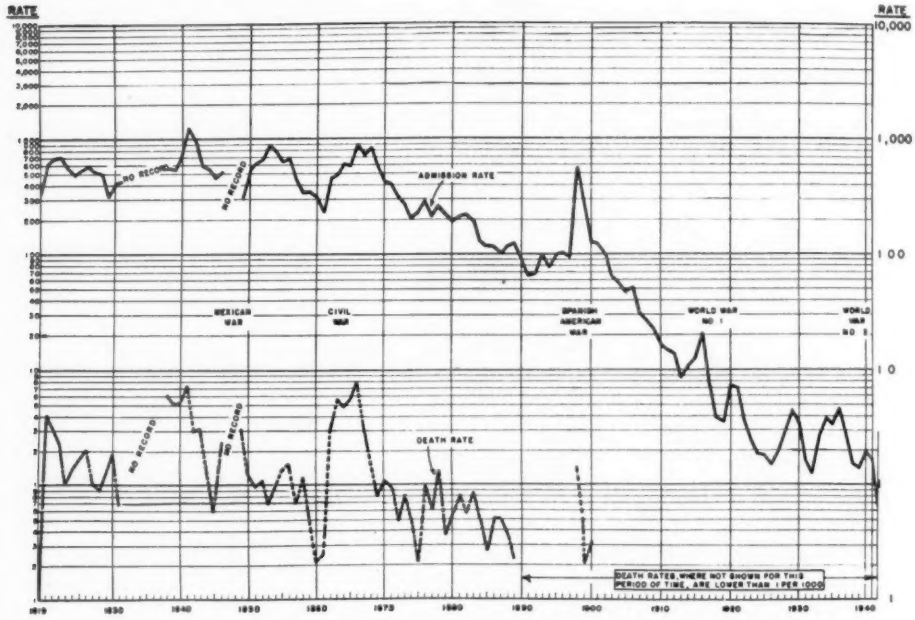


FIGURE 3. *Annual Admission and Death Rates (per 1000) for Malaria in White Enlisted Men in the United States Army, 1819–1941.*

*Specific Measures*

The malaria-control program includes control measures applicable to permanent camps, posts and stations, and measures that can be used to protect troops living in the field.

The control measures used in permanent installations include all the standard methods employed in civil communities, such as the following: an effective antimosquito campaign, including the elimination of mosquito breeding places by drainage or filling, the destruction of aquatic forms with larvicides and the killing of adult mosquitoes in buildings with insecticide sprays; screening and the use of bed nets in living quarters or other buildings; and the treatment of all infected persons with antimalaria drugs. At this point I wish to warn against the misleading and false rumors derogatory to atabrine that are being circulated. The Army is glad that it has adequate supplies of this drug.

The control of malaria in the field depends largely on measures that the soldier can apply for himself. The first of these is the prophylactic use of atabrine or quinine, which should be reserved for emergencies, since neither of them really prevents infection. Both drugs, however, are useful, since they usually prevent the development of clinical symptoms so long as they are taken. This makes it possible for the soldier to stay on his feet and carry out a mission in spite of malarial infection. For at least three years the Army has been concerned with extensive investigations in the search for a more effective malaria prophylactic for use in the field. The second group of measures include the use of bed nets, head nets and mosquito-proof clothing, when indicated and practicable. The third is the use of the new mosquito repellents, which are safe and highly effective. The last measure is the use of freon-pyrethrum aerosol sprays in endemic regions.

*Results of the Control Program*

The results obtained in the Army's malaria-control program during the recent emergency and present war may be considered in two categories—first, the program in the continental United States, and second, the program abroad.

*Control in the United States.* At the beginning of the recent mobilization it was feared that the rapid expansion of the Army might cause an increase in malaria among troops in this country. Plans were therefore made early in 1940 to strengthen all facilities for the control of the mosquito vectors in the United States and in our permanent tropical possessions. This program on military reservations has been supplemented by an extra-military program carried on by the United States Public Health Service, working through state and local health departments. As a part of the Army program, sanitary engineers were commissioned and assigned to key positions throughout the Army. An enormous mosquito-control campaign was organized and carried out in 1941 at the cost of almost $2,000,000. During that year the malaria rate not only failed to rise, but actually dropped to an all-time low of 1.7 per 1000. During 1942 the campaign was intensified, and approximately $3,000,000 were spent. The malaria rate was one third as high as in 1941, namely, 0.6 per 1000. This excellent record cannot be surpassed.

*Control overseas.* As indicated previously, it is infinitely easier to control malaria among troops living under the stabilized conditions of this country than among those living in the field abroad. By anticipating conditions among our troops overseas, however, it has been possible to set up a control program that is comparatively effective. From the beginning, special facilities have been developed for obtaining information about the incidence and the epidemiology of malaria in all parts of the world. All troops sent abroad have been provided with specific information concerning the disease hazards and the methods of meeting them in the regions concerned. The planning has included provisions for safeguarding, augmenting and distributing the Army's supplies of quinine and atabrine and of various materials for mosquito control. It has also included the development and procurement of the newly discovered, highly effective mosquito repellents and sprays and of protective nets. Special malaria-survey and malaria-control units staffed by malariologists, entomologists, parasitologists and sanitary engineers have been sent to our fighting fronts in various parts of the world.

The malarial infection rates in certain overseas regions where protection is difficult are naturally comparatively high and in certain areas they have at times been a matter of some concern. However, on the whole, rates have not been excessive.

TABLE 1. *Annual Admission Rates (per 1000) in Troops in Continental United States and Overseas Theaters, 1942.*

| REGION | ALL CAUSES | DISEASE ONLY | INJURIES | RESPIRATORY DISEASE | VENEREAL DISEASE | DYSENTERY AND DIARRHEA | MALARIA |
|---|---|---|---|---|---|---|---|
| Continental United States | 755 | 664 | 91 | 227 | 38.7 | 7.15 | 0.6 |
| Theaters in temperate zones: | | | | | | | |
| A | 819 | 668 | 152 | 247 | 6.8 | 4.7 | — |
| B | 810 | 664 | 146 | 249 | 3.4 | 1.7 | 1.0 |
| C | 798 | 689 | 109 | 297 | 37.0 | 16.9 | — |
| D | 488 | 408 | 80 | 94 | 9.7 | 14.9 | 0.67 |
| Theaters in tropical and subtropical zones: | | | | | | | |
| E | 1111 | 926 | 185 | 97 | 7.7 | 107.0 | 47.0 |
| F | 1011 | 833 | 178 | 154 | 53.1 | 60.1 | 53.5 |
| G | 958 | 852 | 106 | 115 | 61.0 | 15.6 | 106.0 |
| H | 1128 | 1049 | 79 | 148 | 66.0 | 117.0 | 173.0 |
| I | 1221 | 1091 | 130 | 232 | 34.0 | 206.0 | 38.0 |

In Table 1 are indicated the admission rates for malaria and other diseases in various overseas theaters compared with the rates for similar diseases at home. For obvious reasons the strengths and locations are not shown.

Generally speaking, the health of our troops everywhere has been excellent. The disease rates in all temperate-zone theaters compare favorably with those in the United States, and in some regions they are actually lower than at home. The incidence of malaria is highest in the tropical theaters and among troops in combat areas. It is believed that with the more extensive field use of the new insecticides and repellents the situation even in these areas will improve.

## CONCLUSION

In conclusion it is desired to express the appreciation of the Surgeon General of the Army for the whole-hearted way in which the entire medical profession of this country has supported his program for the prevention of all diseases, including malaria. It is also desired to re-emphasize the importance of malaria as a widespread potential hazard to American troops abroad, and to bring to attention the urgent need of more effective methods for its control. I know of no contribution that could be made to American medicine at this time that would be of greater value to this country and to humanity

than the discovery of an easily administered and effective drug for the prevention of malaria among troops in the field. With the support and help of the medical profession, the search for this important drug will continue in the laboratories of our country.

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# NEWER CONCEPTS OF GONORRHEA*

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BOSTON

THE remarkable developments that have taken place in every line of endeavor related to the fight against the gonococcus in the last few years have led to a radically altered approach to the management of gonorrhea and a somewhat more optimistic outlook regarding its eventual control. The purpose of this paper is to discuss briefly several phases of this problem, with particular reference to the new opportunities and responsibilities of the practitioner in the light of changing concepts of diagnosis, treatment and prevention.

Gonorrhea, under present conditions, presents a threefold problem. The advent of war has reversed a prior trend and has resulted in a considerable increase in the incidence of this disease, thereby creating a problem of military importance. The public-health aspects of the infection are well recognized. The disease remains, however, as much as ever the personal concern of the patient and his physician. In spite of the activities of the federal and state governments and the magnificent work of various social-service agencies, the ultimate objective of complete eradication of this plague can be attained only through the co-operation of all agencies concerned. With income levels rising, the proportion of civilian patients seeking treatment from the private physician instead of the clinic may well increase. Only if the private physician realizes and accepts his responsibilities and avails himself of the supplementary facilities provided by other agencies will the lot of the patient be improved by such a change. At present, it is perhaps too much to say that the clinic patient receives on the whole better care than the private patient, but certainly the collateral activities such as follow-up and the discovery of contacts are far better organized in the clinic than can ever be possible in private practice. By making use of the supplementary services offered by governmental and other agencies, however, the private doctor can vastly increase his effectiveness in the management of single cases and his contribution to the solution of the larger problem.

Improvements in methods of diagnosis are principally concerned with the increased reliance on cultural methods to supplement the smear. Formerly considered a difficult and unreliable laboratory procedure, during the last few years culture of the gonococcus has been developed to a point where it is considerably more reliable than is the smear, especially in chronic cases and in the examination of the secretions of the cervix and the prostate gland. Although culture and smear agree in the majority of cases, those in which a positive culture is found with a negative smear outnumber considerably those in which the converse is true. In some cases reliance on clinical observation is the only possible means of diagnosis. A complete history and careful examination may establish a diagnosis even in the face of negative bacteriologic findings, and it must be remembered that in the case of a suspected contact, the male urethra is the best culture medium existent.

Limitations of the use of the culture in private practice are many, and at present perhaps prohibitive for its routine use in all communities. Uniformly reliable results are obtained only in laboratories staffed by technicians having special training and facilities. Mediums must be fresh; the transportation of material for any distance or delay in plating and incubation appreciably reduces the percentage of positive cultures, and overgrowth of other organisms often interferes with satisfactory examination. For following the progress of the average case, the private doctor should depend principally on clinical signs and the stained smear. Where the diagnosis is in doubt, however, or where it is sought to establish proof of a cure, the use of cultures is almost mandatory, even if obtained at considerable inconvenience. The evidence of less than three negative cultures at weekly intervals is not conclusive. Recent experimental work on the transportation of material for culture, notably by Dr. Oscar Cox,[1] of Boston, raises the hope

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that the availability of this method may be greatly increased in the near future.

Diagnostic measures other than bacteriologic deserve some discussion, especially in the case of so-called "chronic gonorrhea" — a condition that has happily been much less frequent in recent years. Distinction should be drawn between the drug-resistant cases, in which positive smears or cultures indicate the persistence of living organisms, and those in which gonococci cannot be demonstrated in the secretions. In the latter group diagnosis must depend principally on clinical methods, since experience has shown that in only a small proportion of cases is reliance to be placed on the complement-fixation test. Positive results are fairly reliable, but to negative reports little significance can be attached. Clinically, the persistent purulent or crusting discharge at the meatus — the "morning drop" — is almost invariably due to the presence of a large-caliber urethral stricture, a condition that can be detected only by the use of the bulbous bougie — a valuable yet much neglected instrument. Another frequent cause of chronic gonorrhea is infection of the prostate and seminal vesicles, in which case microscopic examination may reveal an excess of leukocytes in the secretion. Following a definite attack of gonorrhea, the finding of pus in the prostatic fluid usually means a persistence of the infection, although it should be borne in mind that a nonspecfic prostatitis may have preceded the gonorrheal infection. Urethral stricture and prostatovesiculitis account for the bulk of cases of chronic gonorrhea in males. In females, cervicitis is outstanding as a focus for latent gonorrhea, whether or not it is accompanied by adnexal disease.

The only excuse for mentioning such well-known facts is the frequency with which they are ignored in practice. It has recently been my experience to see a patient who had been treated by bed rest for six weeks on two different occasions on account of persistent urethral discharge. Sulfonamide drugs had brought about disappearance of gonococci, but the discharge had persisted. Massage of the prostate had been carried out on one or two occasions, but no sounds or bougies had been passed. Calibration of the urethra revealed a large-caliber stricture in the anterior urethra, dilation of which brought about the rapid disappearance of the discharge. It goes without saying that no manipulation should be done in the presence of a positive smear.

In a broad sense, a discussion of diagnostic methods may include tests of cure. This is an extremely important matter, and the term "cure" means different things to different people. To the bacteriologist it means the disappearance of organisms from the tissues. To the clinician it should mean not only the elimination of gonococci but the restoration of tissues to a normal condition. To one patient it may mean cessation of the discharge, whereas to another it may signify an unattainable state of bliss that he never hopes to reach. In the latter type of patient the fear of gonorrhea constitutes a disease in itself, and the added assurance afforded by a negative culture is a boon to both patient and physician and well worth almost any inconvenience to secure.

In acute cases that respond quickly and favorably to chemotherapy, the disappearance of discharge and shreds from the urine, together with three or more negative cultures of urethral and prostatic secretions at weekly intervals, may be considered adequate proof of cure. If cultural facilities are not readily available, a much longer period of observation is necessary. Opinion differs concerning the advisability of examining the anterior urethra for stricture in this type of case. As a urologist, I find it difficult to discharge a patient as cured without first assuring myself of the absence of stricture in the anterior urethra, as well as of the normal condition of the prostatic secretion. The passage of a bulbous bougie several weeks after the cessation of symptoms and the disappearance of organisms can do no harm if reasonable care concerning technic is observed and if the disease has been cured. If it has not been cured, the sooner the fact is detected the better.

In chronic cases, the problem is much more difficult. In addition to the disappearance of discharge and shreds and repeated negative cultures, the lapse of several months without recurrence of signs, with the patient under frequent observation, constitutes the best indication of permanent cure. Here again, serologic tests are of limited value, and provocative measures, such as the ingestion of alcohol, are not to be recommended. They are of doubtful value and are not devoid of danger.

With respect to therapy, an excellent pamphlet on gonorrhea issued by the Massachusetts Society for Social Hygiene[2] in 1936, and circulated for some years thereafter, reads as follows:

> The treatment of gonorrhea depends upon keeping all the infected parts that can be reached clean and free from pus, and upon helping the membranes to get well. There is no medicine which will cure it quickly. . . . There is no medicine which, taken by mouth, will cure gonorrhea, or even be of much help.

This was sound doctrine in 1936, as it had been for many years before. The above situation should be compared with that existent at present. The amazing efficacy of chemotherapy has in all but a few cases removed the management of gonorrhea from its status as a urologic procedure into the category

of medical treatment. To such an extent is this true that the urologist, as such, feels some embarrassment in speaking on this subject, except in the way of valedictory. Certainly a disease in which well over 90 per cent of cases are permanently cured by oral ingestion of a drug, and in which suppurative complications have almost disappeared, can call for little action of a surgical nature. That disregard of surgical principles may be disastrous, however, is attested by the occasional patient who appears with the meatus occluded by a wad of cotton under the foreskin and wondering why his infection has failed to respond to the new drug.

The chemotherapy of gonorrhea has received such thorough discussion in the last few years that extended comment is unnecessary. It is generally agreed that most acute cases respond to a dosage of 20 gm. of the chosen drug, distributed over five or more days. If cure does not result from the first course or if cultural proof of cure is not obtainable, a second course of similar dosage should be given. For routine use, sulfathiazole is the drug of choice. Sulfadiazine appears to be equally efficacious, but it is more expensive and its lack of toxicity is largely a theoretical advantage, since serious reactions from sulfathiazole in the dosage mentioned above are rare. Newer drugs at present under trial have little to offer over sulfathiazole. Attention to general hygienic measures and avoidance of alcohol and sexual activity are of course essential. A large fluid intake is desirable. In the average case rest in bed is not necessary and the patient's occupation need not be interrupted.

Cases resistant to sulfonamide drugs form an interesting group. It is generally considered that cases resistant to one of these drugs show little response to others of the group, and that an increase in dosage is of little value. This is true in general, although exceptions occur. One very resistant case in my experience was treated by the usual methods without effect. A massive dose of sulfapyridine was given over a twenty-four-hour period preliminary to a contemplated fever treatment, and the patient showed such marked improvement that the heat treatment was considered unnecessary and complete recovery ensued without it.

Several courses are open for the treatment of those cases in which response to the routine administration of sulfathiazole is not satisfactory. A shift to another drug of the sulfonamide group and a period of bed rest for ten days or two weeks are the first measures to be tried. Gentle local treatment of the types in common use prior to the advent of the sulfonamide drugs will in a few cases tip the scales in favor of recovery. Fever therapy properly administered produces a cure in a large percentage of cases, but has definite disadvantages. It requires extensive facilities and constant supervision, and is not without danger to life. Only serious complications or extremely refractory infections justify its use, and then only in otherwise healthy subjects. Results are seemingly better if a preliminary large dose of a sulfonamide drug is given during the preceding twenty-four-hour period. Treatment by various types of vaccines or filtrates has in my experience been extremely disappointing and in some cases serious complications have been attributed to their use. Their field of usefulness is extremely limited.

Other chemotherapeutic agents such as penicillin may be extremely useful in the treatment of sulfonamide-resistant cases. This subject is now under investigation, and in vitro tests show that the gonococcus is extremely sensitive to the action of penicillin. According to a recent report,[3] penicillin has shown great promise in the treatment of gonococcal infections in man. Further work on this subject will be awaited with interest.

It is in the field of prevention and control that the private practitioner can find the most important of the new opportunities afforded by recent innovations. The establishment of state clinics on a large scale and the large amounts of money spent by the federal government in research on gonorrhea are indicative of the importance of this problem. The value of the work of the social services of large institutions and private agencies such as the Society for Social Hygiene cannot be overrated. As a result of all these activities, the means and organization are now available to bring about the eradication of this disease if properly employed. The above agencies cannot do the job alone, however, and the large number of cases in which the private doctor constitutes the only contact with the patient increases his responsibility.

Measures that help to prevent the spread of gonorrhea include, first, the continuation of treatment until cure is established. A full discussion of the situation on the occasion of the patient's first visit goes a long way toward gaining confidence and preventing a lapse of treatment. A certain proportion of treated cases become asymptomatic carriers, and it is in this group that cultures as tests of cure are of extreme importance. If adequate facilities for culture are not available nearby, the reference of the patient to a laboratory in a large center should if possible be made.

Perhaps one of the most important ways in which the private doctor can co-operate in the prevention of gonorrhea is in reporting lapsed cases and suspicious contacts to his state department of health. In the past such co-operation in regard to the venereal diseases has not been so wholehearted as in the case of other communicable diseases. The splendid report recently published by

Dr. E. B. Howard and others[4] on the epidemiologic investigation of syphilis and gonorrhea in the Army and Navy in Massachusetts is evidence of the excellent results that can be obtained by well-trained and experienced professional personnel in utilizing information regarding contacts. The Massachusetts Department of Public Health is eager for the co-operation of the private physician and will make the best use of any information that can be furnished.

The general practitioner is occasionally called on for advice concerning prophylaxis. It has always been my opinion that thorough washing with soap and hot water, together with micturition immediately after exposure, will in most cases prevent gonorrhea. The external application of calomel ointment and the injection of 1 per cent Protargol into the anterior urethra give added assurance. Recently a report on the oral use of sulfathiazole as a prophylactic has appeared in the literature.[5] It appears to be highly effective, reducing the incidence of gonorrhea and chancroid in exposed soldiers to a remarkable extent. In single doses of 5 gm. it is well tolerated. Unfortunately, the effect of a repetition of this dose at frequent intervals over a long period of time is uncertain as regards both cumulative effects and sensitization, and further experimentation seems necessary before the method can be recommended for wide use.

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In conclusion, it may be stated that recent developments in the management of gonorrhea have placed it in the group of diseases that are both preventable and curable. The private practitioner occupies an important position in any program looking to eventual eradication of gonorrhea.

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## SUPRALEVATOR ABSCESS

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FRAMINGHAM, MASSACHUSETTS

SUPRALEVATOR abscess is a rare disease with which few surgeons have had an extensive experience. The fairly numerous papers on the subject have consisted chiefly of brief reports in which there has been little discussion of diagnostic and therapeutic problems and particularly scanty reference to the surgical anatomy involved. A recent case at the Framingham Union Hospital has prompted this review of the subject. The diagnosis of supralevator abscess has not previously been made during the fifty years of the hospital's existence.

Infections occurring about the rectum and anus have been classified as infralevator and supralevator according to their anatomic relation to the pelvic diaphragm. Green[1] has subclassified these infections as follows:

Infralevator infections:
- Cutaneous: consisting of folliculitis surrounding the anal margin.
- Marginal: infection at the anal verge not affecting the sphincters.
- Ischiorectal: infection of the ischiorectal space usually arising from infections about the crypts of Morgagni.

Supralevator infections:
- Superior pelvirectal.
- Retrorectal.
- Submucous or mural: occurring in the submucosa of the rectal wall.

Infralevator infections are relatively frequent and their surgical treatment is well understood. This paper deals with those infections lying above the level of the pelvic diaphragm. In order to understand the problem of supralevator abscess, a brief review of the relevant anatomy is in order.

### Anatomy and Pathology

The well-developed fascial layer covering the iliopsoas muscle in the iliac fossa descends over the brim of the pelvis, at which, at the linea terminalis, it is adherent to the periosteum and below which it becomes known as the endopelvic fascia. Descending on the pelvic surface of the obturator internus muscle for a short distance, this endopelvic fascia undergoes a tendinous condensation or thickening that extends along the entire lateral wall of the pelvis. It is from this area of thickening, the arcus tendineus, that the lateral portion of the levator ani muscles takes origin. These muscles, arising on each side of the pelvis, insert into a median

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raphe. The more anteroposterior or medial fibers, arising from the posterior surface of the pubes, are directed posteriorly along the sides of the prostate or vagina to blend with the longitudinal muscle of the rectum near the anal margin[2] and stalks, and along them extend the middle hemorrhoidal vessels.

The pelvic peritoneum covering the front and sides of the rectum extends downward for a variable distance to form the pouch of Douglas. It

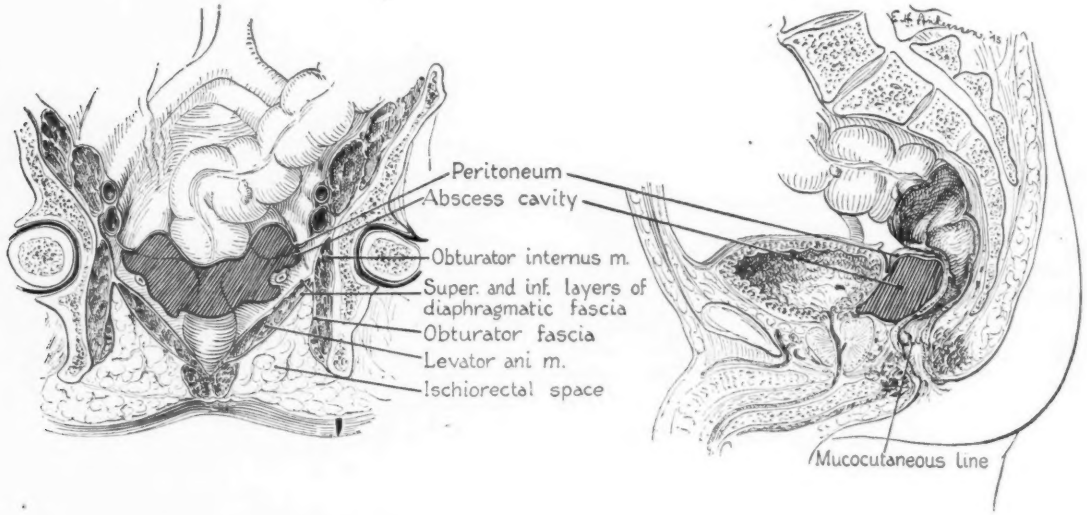


FIGURE 1. *Frontal and Median Sections of the Pelvis Showing the Extent of a Superior Pelvirectal Abscess. Note the extension of the abscess toward the base of the bladder, which frequently results in bladder-neck obstruction.*

continue to their insertion on the sacrum and coccyx.

At the arcus tendineus the endopelvic fascia divides into three layers (Fig. 1). The most lateral of these layers descends over the pelvic surface of the obturator internus and pyriformis muscle and is known as the obturator fascia. It forms the lateral wall of the ischiorectal space. The remaining two layers of pelvic fascia are intimately related to the superior and inferior surfaces of the levator ani muscles and are known as the diaphragmatic fascia. The inferior layer of diaphragmatic fascia, also known as the anal fascia, after covering the inferior surface of the levator ani is inserted into the side of the anus and forms the medial wall of the ischiorectal space. The superior layer of diaphragmatic fascia, also known as the rectovesical fascia, after covering the superior surface of the levator is reflected over the side of the rectum — over the prostate and bladder in the male and over the upper vagina, cervix and bladder in the female. All the pelvic organs in both sexes are thus encased in a fascial sheath that is continuous with the superior layer of the diaphragmatic pelvic fascia.

Lateral fibrous condensations extend from the fascial encasement of the rectum on each side to the lateral portions of the sacrum. These comprise the lateral ligaments of the rectum, or rectal does not come in contact with the levatores ani but is reflected onto the bladder in the male and onto the cervix and uterus in the female. Between the pelvic peritoneum and the superior surface of the levatores ani there is thus a potential space that contains adipose tissue. It extends from the fascial covering of the prostate or vagina anteriorly to the sacrum posteriorly, and between the superior layer of diaphragmatic fascia on each side. This is the supralevator space, which is divided transversely by the rectum and rectal stalks into anterior and posterior compartments. The anterior compartment has been designated as the superior pelvirectal space, and the posterior compartment is called the retrorectal or presacral[3] space.

The supralevator space is continuous with the ischiorectal space through the separations between the levator ani and coccygeus muscles, with the gluteal and obturator regions by way of the sciatic notches and obturator foramina,[4] respectively, and with the extraperitoneal space of the remainder of the abdomen. Suppuration in the supralevator space may extend through or around the levatores ani into the ischiorectal space to point in the skin of the perineum. It may, however, point in the gluteal region or the groin, or extend upward into the retroperitoneal and perirenal spaces. In male patients the inflammatory reaction frequently ex-

tends anteriorly about the structures at the base of the bladder, causing acute urinary retention. In view of the many reported cases in which urinary retention has been a prominent part of the clinical picture, it is surprising that this fact has not received more emphasis.

A considerable difference of opinion exists concerning the route by which infection reaches the supralevator space. A careful study of the reported cases indicates that, in the majority, the route of infection remains undisclosed even in those cases that come to autopsy. A notable exception is the case reported by Meyers[5] in which a twenty-three-year-old man was gored by a cow, the horn piercing the rectal wall just above the levator ani. An abscess developed in the superior pelvirectal space, perforated the obturator fascia laterally, extended through the great sciatic notch to the gluteal region, and eventually opened through the skin of the buttock. Cure was effected by preliminary colostomy followed by excision of the sinus.

Most writers agree that infection of the supralevator space is likeliest to occur as a result of infection occurring about the mucocutaneous line in the crypts of Morgagni. Miles[3] states that supralevator infections always spread from a septic lesion of the rectum or anus by way of lymphatics that extend laterally from the rectum in relation to the levatores ani, a modus operandi that Hibshman[6] considers of the first importance. Several authors[6-8] hold that trauma to the rectum above the level of the insertion of the levatores ani by an ingested foreign body may occasionally be the etiologic agent. In the case presented below, the patient attributed his symptoms to a prune pit swallowed two days before. No evidence of trauma to the rectum was found on repeated proctoscopic examination, and no foreign body was recovered in the contents of the abscess.

Morrissey[9] states that from 82 to 94 per cent of perianal and ischiorectal infections occur in men, and that in about 75 per cent of these there is a history of a previous gonococcal infection. The resulting low-grade nonspecific infection due to secondary bacterial invaders may flare up, spread from the prostate and seminal vesicles, and cause a vesicointestinal fistula or, "depending on the direction and extent of the inflammatory process, [may] end in ischiorectal, superior pelvirectal or posterior pelvirectal abscess and, by lymphatic extension, localized suppuration about the kidney." Morrissey further points out that whereas prostatic abscess is usually limited in its spread by the rectovesical fascia (of Denonvilliers), infection perforating the seminal vesicle may escape directly into the superior pelvirectal space. Morrissey's theory is supported by Drueck,[8] Bullock[10] and Ingegno and Spitz,[11] yet none of these writers present a case that was proved to result from suppuration arising in the genital apparatus. Morrissey's suggestion is, nevertheless, an interesting one, and the process described is anatomically possible. In the case reported below, an extended effort was made to demonstrate evidence of infection in the prostate and seminal vesicles, but without success.

Although it is true that the majority of cases reported have been in men, many have also been reported in women. In fact, the 5 cases reported by Bacon and Reuther[12] occurred in females. In the fifteen-year period from 1928 to 1942, a total of 82 cases in which a diagnosis of fistula in ano, perianal abscess or ischiorectal abscess was made were treated at the Framingham Union Hospital. Of these, 35 (43 per cent) occurred in females, a figure that certainly does not correspond to that suggested by Morrissey. It has been amply shown by Buie[13] and others that this type of infection arises in the anal crypts.

Infection in the ischiorectal space may extend upward through the pelvic diaphragm to involve the supralevator region. Thompson and Dunphy[14] have reported 3 such cases.

Other routes of infection of the supralevator spaces have been mentioned as possibilities but rarely if ever reported. These include cases resulting from caries or sepsis of the pelvic bones, from retroperitoneal sepsis arising from perforations in the gastrointestinal tract, particularly from appendicitis and diverticulitis, from infection arising in the female genital apparatus, especially postpartum or post-abortal endometritis, and so forth. Finally, infection may be carried directly to the supralevator space by the blood stream.

## Clinical Picture

The clinical picture of supralevator abscess may be extremely confusing, particularly in the early stages. Usually the infection first manifests itself as a general malaise associated with more or less fever and leukocytosis. After a variable period — a few days to two months in the reported cases — during which constitutional symptoms become slowly or rapidly worse, the patient begins to note pelvic discomfort, frequently described as a swelling in or about the rectum. This discomfort is often temporarily relieved by defecation. Gradually symptoms of low-intestinal obstruction with increasing constipation often associated with intermittent diarrhea supervene. In men the inflammatory reaction frequently extends to, or compresses, the structures about the base of the bladder, causing urinary symptoms of varying severity (Fig. 1). Not infrequently acute urinary

retention is the presenting complaint, and this, associated with fever and leukocytosis, may point strongly to the urinary tract as the seat of the lesion. Eventually the symptoms of a deep-seated abscess with severe, localized pain, chills, fever and extreme leukocytosis present themselves.

The diagnosis is usually established by examination of the rectum by palpation, instrumentation or, preferably, both. In the early stages, tenderness may be elicited on palpation at a point slightly above the anal sphincters, usually limited to one side in a superior pelvirectal abscess and posteriorly in a retrorectal abscess, and possibly associated with some localized injection and edema of the rectal wall. Later, as it becomes well formed, the superior pelvirectal abscess tends to surround more or less completely the front and sides of the rectum, pushing in the walls so that a pronounced narrowing of the rectal ampulla is readily seen and felt, but this narrowing differs from that caused by neoplastic disease in that overlying mucosa is intact. Barium enema x-ray studies may be helpful in demonstrating the narrowing. At this stage the retrorectal abscess may push forward the posterior wall of the rectum and be palpable as a tender swelling extending upward for a variable distance. Extreme pain elicited on firm pressure over the skin between the tip of the coccyx and the anus is said to be an important diagnostic sign.[15] In the later stages an abscess arising in one of the subdivisions of the supralevator space tends to surround the rectum completely by penetrating the rectal stalks. In late and untreated cases, extension to the gluteal regions, groin and so forth may take place.

Urologic studies have not been frequently reported, even in those cases presenting evidence of obstruction of the bladder neck. Certainly careful palpation of the prostate and seminal vesicles should be done in an attempt to determine whether the infection is arising from these structures. Cystoscopic examination was made in the case presented below with essentially negative findings.

## Treatment

As with suppuration in all other parts of the body, adequate incision and drainage is the only treatment. With reasonably early diagnosis and surgically adequate drainage, spread of the infection to the less accessible regions of the pelvis and sinus formation may be effectively prevented. Well-directed sulfonamide therapy may be a useful adjunct to adequate surgery in preventing such complications. In cases presenting evidence of low-bowel obstruction or extensive sinus formation, temporary sigmoidostomy may be of definite value in putting the pelvic colon and rectum at physiologic rest.

The surgical approach to the superior pelvirectal space may be made by a longitudinal or T-shaped incision lateral to the anal sphincter. The fat of the ischiorectal space is traversed by sharp and blunt dissection until the levator ani muscle is identified by palpation. This muscle and its ensheathing fascia are divided in an anteroposterior direction, perpendicular to the direction of its fibers, and the superior pelvirectal space is entered. Transverse division of the levator fibers is evidently harmless and allows for better drainage than if the muscle bundles are merely separated. Should the abscess extend horseshoe-like around the front and side of the rectum, bilateral drainage through both ischiorectal spaces will allow through-and-through irrigation and improved drainage.

Drainage of the retrorectal space may be done by an incision parallel with and slightly lateral to the coccyx and lower sacral segments. The soft tissues are incised until the presacral pelvic fascia is identified. This structure is divided to allow entrance into the retrorectal space.

Hayden[16] reports good results in several cases of superior pelvirectal abscess by instituting drainage through the rectal wall at the lower end of the abscess where it bulges into the rectum. Drainage is facilitated by inserting a 12-mm. rubber tube into the cavity and allowing it to protrude through the anus. Hayden warns against making incisions through both the rectal wall and the ischiorectal space and against incising the rectal wall after the abscess has extended into the ischiorectal space, since, in either case, there is danger of producing a high fistula.

## Case Report

A 61-year-old, Russian-born Jew was admitted to the Framingham Union Hospital on April 21, 1942. Ten days before admission, he noted malaise and cramping lower-abdominal pain, which he attributed to having swallowed a prune pit 2 days previously. These symptoms were not severe, and he continued working until the 4th day of his illness, when he began to develop headache, fever and generalized muscular aches and pains. A physician found rales at the bases of both lungs posteriorly and recorded a temperature of 103°F. A tentative diagnosis of pneumonia was made and the patient was given sulfathiazole, without improvement. The following day he noted difficulty in getting the urinary stream started and some burning on urination, and passed only small amounts of urine at a time. There was no incontinence, but the dysuria became progressively worse and this, together with fever, was the chief complaint. Twenty-four hours before admission, he suffered acute urinary retention for which catheterization was required. For the 4 or 5 days immediately preceding admission the bowels did not move in spite of repeated enemas, the abdomen became

moderately distended, and the patient complained of fullness in the rectum. There was no nausea or vomiting.

The past history included typhoid fever at the age of 21, a productive cough for many years, attributed by the patient to cigarette-smoking, and prolapsing hemorrhoids with occasional rectal bleeding for at least 20 years.

Physical examination revealed a poorly nourished man of small stature who appeared to be moderately acutely ill. The temperature was 101°F., the pulse 86, and the respirations 26. An adenoma about 1 cm. in diameter was palpable in the isthmus of the thyroid gland. The chest showed limited but equal excursion on both sides. At the lung bases, particularly the left, were numerous moist rales. The heart was not enlarged and the rhythm was regular, but there was a harsh systolic murmur over the aortic area. The blood pressure was 175/75. The abdomen was slightly distended and peristalsis was hyperactive, but there was no tenderness or other evidence of peritoneal irritation, and no masses could be felt. Rectal examination disclosed a firm, slightly irregular and practically nontender mass extending upward from the level of the upper border of the prostate as far as the examining finger could reach. The rectal mucosa overlying the mass was unbroken, as was demonstrated by repeated proctoscopic examination, and the mass caused a marked constriction of the rectal ampulla. This constriction was largely produced by displacement of the lateral walls of the rectum toward the midline, and to a lesser extent by posterior displacement of the anterior wall. The prostate was small and completely nontender, and the seminal vesicles could not be felt. The prostatic secretion was normal on microscopic examination. The posterior rectal wall did not appear to be involved. There was no tenderness over either ischiorectal space. Proctoscopic examination, in addition to demonstrating the constriction, which would not allow the instrument to pass, showed some injection of the rectal mucosa. There was a rosette of internal and external hemorrhoids, but no evidence of recent sepsis or trauma to or around the mucocutaneous line. Cystoscopic examination revealed slight injection of the trigone but no other abnormalities of the bladder or prostate. The ureteral orifices were normal, but the ureters were not catheterized.

The white-cell count was 32,000, with 97 per cent neutrophils. There was no anemia, and blood-chemistry studies were within normal limits. X-ray examination (Fig. 2) demonstrated narrowing of the rectal ampulla, but the remainder of the colon showed no abnormalities. The chest showed evidence of chronic bronchitis. The bones of the lumbar spine and pelvis were within normal limits.

The patient was placed on constant urethral-catheter drainage and was given small doses of sulfathiazole by mouth. On this regimen the temperature and white-cell count rapidly approached normal. During the early part of the hospitalization, enemas were productive of gas and feces, and the symptoms of obstruction suffered prior to admission were partially relieved. The palpable portion of the rectal mass remained unchanged, but after several days symptoms of low-intestinal obstruction became more acute.

Because the symptoms of low-colonic obstruction were associated with some increase in abdominal tenderness, laparotomy was performed on May 2. Exploration of the peritoneal cavity revealed no abnormalities except in the pelvis, where a mass that appeared to be inflammatory in origin extended upward from the pelvis, surrounding the rectosigmoid and elevating the peritoneum of the pelvic floor. No evidence of diverticulitis was found. There was moderate distention of the entire colon. A long-loop sigmoidostomy was done.

Following the sigmoidostomy, the patient's condition improved. The temperature, pulse and white-cell count returned to normal and the rectal mass began to regress.

FIGURE 2. *Barium Enema Showing Narrowing of the Rectal Ampulla.*
*A urethral catheter is in place.*

On the 10th postoperative day, the urethral catheter was removed and the patient was able to void satisfactorily with no residual urine. Because of the striking local and general improvement, further surgery was delayed in the hope that complete regression would take place. By the 14th postoperative day, the mass was much smaller and the constriction of the rectal ampulla allowed the easy passage of two fingers. Thereafter there was no further regression, and on the 17th postoperative day softening of the mass was noted, particularly on the left side. On the following day, the supralevator space was opened by dividing the fibers of the left levator ani muscle, which was approached through the left ischiorectal space. About 180 cc. of foul-smelling pus was evacuated from an abscess cavity that extended anteriorly to the opposite side of the rectum, but that did not extend posteriorly because of the rectal stalks, which were easily identified by palpation. The evacuated pus showed no growth on either aerobic or anaerobic culture.

Following drainage of the abscess, the patient did well and was discharged on the 8th postoperative day. At home the abscess was irrigated daily, but on June 21

he was readmitted to the hospital because the sinus tract leading to the abscess cavity had contracted sufficiently to prevent adequate drainage. Lipiodol injection of the abscess cavity at that time showed it to extend horseshoe-like around the front and sides of the rectum (Fig. 3).

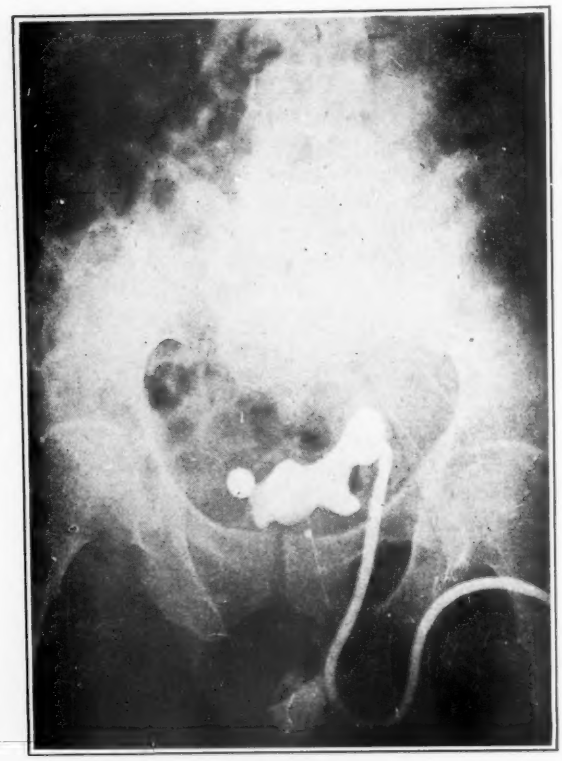

FIGURE 3. *Lipiodol Injection of the Abscess Cavity One Month after the Institution of Drainage.*

More adequate drainage of the abscess was obtained, not only by enlarging the incision previously made on the left side of the anus, but also by making a second incision on the right side, with division of the fibers of the right levator ani muscle. This allowed satisfactory through-and-through irrigation and drainage and, except for a brief interval when a superficial abscess of the abdominal wall required drainage, improvement was progressive and satisfactory. The drainage wounds were kept open until the abscess cavity had closed with granulation tissue, after which the sinuses were allowed to close.

On August 8, the wounds were found to be completely healed. The perirectal mass had completely disappeared, but scar-tissue induration was still readily palpable. On January 4, 1943, 7 months after the abscess had been drained, this induration had completely disappeared and proctoscopic and x-ray studies revealed the rectal ampulla to be normal. The patient was therefore readmitted for closure of the colostomy, which was accomplished without incident. Since then he has enjoyed normal bowel and sphincteric function and has remained well.

## DISCUSSION

This case presents several interesting features. The first is that an initial diagnosis of pneumonia was made. This mistake has been frequently commented on in the literature, and is due to the late appearance of localizing symptoms. The patient had a chronic bronchitis with rales at both bases that were undoubtedly of long standing and were in no way related to the course of the present illness, but that when combined with symptoms of hidden sepsis pointed strongly to the chest as the source of the symptoms.

The second point of interest is the marked local and general improvement that followed sigmoidostomy. As has been stated, this operation was done because of the gradual progression of symptoms and the signs of low-intestinal obstruction. The rapid regression of the mass and the fall of the white-cell count and temperature to normal following the operation gave hope that the products of suppuration would resorb completely without recourse to further surgery. In view of the subsequent course of the disease, it appears that this hope was ill grounded. In cases presenting complicated sinus tracts, sigmoidostomy would undoubtedly prove a valuable preliminary step.

The frequency with which urinary symptoms are present, often as the chief complaint, has been previously commented on and is well illustrated by this case. Cystoscopic examination revealed no intrinsic cause for the obstruction of the bladder neck, which was probably due to extension of the inflammatory process to the structures about the base of the bladder or to pressure on these structures by the mass. Urinary symptoms have not been reported in cases occurring in females.

## SUMMARY

The anatomy of the supralevator space is reviewed, together with a résumé of current theories concerning the routes by which infection takes place. It seems logical to assume that such infection usually arises in the mucocutaneous line and is carried by lymphatic drainage to the supralevator space.

The clinical picture of supralevator abscess is essentially one of prolonged sepsis, associated with a perirectal mass and, eventually, with pelvic pain and low-intestinal obstruction. Male patients frequently present symptoms of obstruction of the bladder neck of greater or less severity. The diagnosis is not difficult if the condition is kept in mind.

Treatment consists in early diagnosis followed by adequate surgical drainage. Preliminary sigmoidostomy is occasionally indicated in cases seen late in the disease or in which fistulas are present.

A case successfully treated by surgery is reported.

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# THE INTRAVENOUS USE OF LANATOSIDE C*


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IT IS the purpose of this paper to discuss the parenteral use of digitalis glycosides, and to report on the intravenous use of a new glycoside of *Digitalis lanata*, Lanatoside C.

Certain questions regarding the intravenous use of digitalis frequently arise. The physician may ask the following: Is intravenous digitalis therapy necessary? Is it safe? Has it any advantages over other parenteral means of giving digitalis, such as the subcutaneous or intramuscular route? How does Lanatoside C given intravenously compare in action and safety with the other glycosides of digitalis?

It is generally agreed that the average case of cardiac decompensation can be treated effectively by the oral use of digitalis. There are, however, patients with cardiac decompensation with severe symptoms of failure produced both by rapid and irregular and by rapid and regular ventricular action who are often urgently in need of digitalis. Rapidity of action may predominate over all other considerations.

The customary method of full digitalization involves distribution of the drug in such a manner as to produce its full effect within two or three days. The usual method is to give it in divided doses. The average full dose is rarely recommended, for the reason that it is too large for sensitive patients and may result in toxic symptoms. Robinson[1] gave from 15 to 25 cat units of digitalis in a single dose to a series of 26 patients with auricular fibrillation and observed slowing of the heart rate in two to five hours, with the maximum effect in fifteen to twenty-four hours. Although he encountered no reaction in his series, he did not advocate the general use of his method. One and a half grains of the powdered leaf of digitalis per ten pounds of body weight is a useful working guide, but there is a definite variation in its effect, some patients needing more and some less. It has also been shown that *U.S.P.* preparations of digitalis when assayed by the frog method vary by as much as 300 per cent.[2] It can thus be seen that a single dose based on weight carries much uncertainty and danger, even though it may be fairly rapid in action.

Furthermore, many patients with chronic passive congestion have nausea and vomiting and thus must be given digitalis by some other route than the oral one. Levy[3] has been an advocate of the rectal route, but according to White[4] the rectal administration of digitalis, either as a suppository or an enema, is unnecessary and unpleasant. It certainly is not a procedure that invites common usage.

The digitalis glycosides have been administered by the subcutaneous and the intramuscular route. Both are to be condemned. These glycosides when given subcutaneously are intensely irritating; they cause considerable soreness and induration and at times sloughing. Likewise, when given intramuscularly they cause soreness and induration. Clarke[5] found that a 27 per cent larger dose of digifolin was needed to produce toxic symptoms when given intramuscularly than when given intravenously. Moreover, the reliability of absorption by the former route in cardiac decompensation is highly uncertain. In addition, patients with cardiac decompensation who are unconscious require other methods of administration than the oral one.

Since there is definite indication for the intravenous use of digitalis glycosides it was decided to investigate a new one, Lanatoside C, to determine its rapidity of action and safety when given in-


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travenously, and in the light of these factors, to compare it with other preparations already investigated and in common use. The results are reported below.

In addition to *Digitalis purpurea*, another plant, *D. lanata*, yields digitalis glycosides. In recent years much work has been done on the latter species, and complete chemical elucidation of its products has been accomplished by Smith,[6] Stoll[7, 8] and other workers.

*D. lanata* contains three glycosides, known as A, B and C. The A and B components, deprived of one glucose and acetyl radical by enzymatic action, are present in *D. purpurea* in the form of digitoxin and gitoxin. The C component (Lanatoside C) has no chemical relation with the glycosides of *D. purpurea*. Smith has shown that it differs from the genins of other glycosides derived from *D. lanata* and *purpurea* by the structure of its aglucone, digioxigenin. Stoll classified the relation between the two digitalis plants by isolation of all their cardioactive glycosides, together with the products of their enzymatic hydrolysis.

The initial pharmacologic analysis of Lanatoside C was carried out by Rothlin.[9, 10] Its toxicity for the cat and frog was established, and preliminary investigation of its cumulative properties and absorption from the gastrointestinal tract was made. It was found that Lanatoside C is well absorbed and that it has a marked cumulative effect on the heart of the frog and the cat, similar to that of digitoxin. Clinical interest in this substance began with the pharmacologic work of Moe and Visscher[11] on heart and lung preparations. Their study suggested that Lanatoside C is the least toxic and the most potent of the *D. lanata* glycosides. Essex, Herrick and Visscher[12] directed their interest toward the problem of the effect of these glycosides on the coronary blood flow and blood pressure of dogs. By inserting a *Thermostromuhr* into the coronary artery, they established that doses f Lanatoside C below the nausea-producing level had no effect on the coronary blood flow of trained dogs. The blood pressure showed no change following intravenous injections of the therapeutic dose.

Lanatoside C is a crystalline substance. Biologic assay is not necessary and its dosage may be determined gravimetrically rather than by the cat-unit method, once its therapeutic efficacy has been established. It is not subject to changes in potency, since it is a chemically pure substance containing no enzymes.

Lanatoside C (Cedilanid) was furnished* for these experiments in ampule form. Each cubic centimeter of the solution contained 0.2 mg. of the drug. Fahr and La Due[13] have determined that 8 cc. of the solution intravenously is the optimum digitalizing dose. This was the amount used in the cases reported below.

The slowing of the heart rate in auricular fibrillation as such patients come under the influence of digitalis is a simple and graphic method of observing the onset of the action of digitalis. In order, therefore, to test the efficacy of Lanatoside C, it was decided to study the heart-rate changes in 22 selected cases (Table 1). All these patients had auricular fibrillation, and none, with one exception, had received digitalis in any form for at least one month. All the patients had original apical rates of at least 120 per minute, determined by stethoscope. Counts were made every five minutes for the first hour and hourly thereafter. The patients remained in bed for at least twelve hours before medication was given in 2 cases in which it was thought that withholding the drug might endanger life. The intravenous route was used in all cases. No other medication was used. Electrocardiograms were made in all cases, to rule out thrombosis of the coronary artery.

TABLE 1. *The Slowing of the Apical Rate following the Intravenous Injection of Lanatoside C.*

| Case No. | Initial Apical Rate | Subsequent Apical Rate | Time |
|---|---|---|---|
| | | | *hr.* |
| 1 | 141 | 78 | 10 |
| 2 | 144 | 82 | 4 |
| 3 | 152 | 75 | 3 |
| 4 | 136 | 71 | ½ |
| 5 | 143 | 74 | 2 |
| 6 | 134 | 71 | 5 |
| 7 | 154 | 73 | 5 |
| 8 | 166 | 69 | 3 |
| 9 | 145 | 72 | 2 |
| 10 | 144 | 72 | ¼ |
| 11 | 147 | 73 | 2 |
| 12 | 138 | 78 | 3 |
| 13 | 132 | 83 | 6 |
| 14 | 136 | 82 | 12 |
| 15 | 164 | 72 | 11 |
| 16 | 168 | 78 | 4 |
| 17 | 142 | 84 | 6 |
| 18 | 164 | 82 | 1 |
| 19 | 142 | 74 | 3 |
| 20 | 148 | 78 | 4 |
| 21 | 134 | 72 | 3 |
| 22 | 143 | 75 | 5 |
| Average | | | 4 1/3 |

The average age of the patients was fifty-four years. There was no classification regarding the severity of decompensation. There were 6 cases of rheumatic heart disease with mitral stenosis and regurgitation, 2 cases of hypertensive heart disease and 14 cases of arteriosclerotic heart disease.

In all cases the heart rate, irrespective of its original level, dropped to 85 or below within twelve hours after receiving Lanatoside C. The average period of fall was three hours and fifty-four seconds. In 2 cases there was a rapid drop, in one

*By the Sandoz Chemical Works, Incorporated, New York City.

from 144 to 72 within fifteen minutes, and in the other from 136 to 71 within thirty minutes. There appeared to be no correlation between the rapidity of drop in the series as a whole and either the original rate or the degree of decompensation.

Figure 1 shows the reactions of apical rate during the first hour at fifteen-minute intervals and each hour thereafter in 4 cases. These are representative of the series. In all the cases there was a drop of 15 to 80 beats within fifteen minutes after

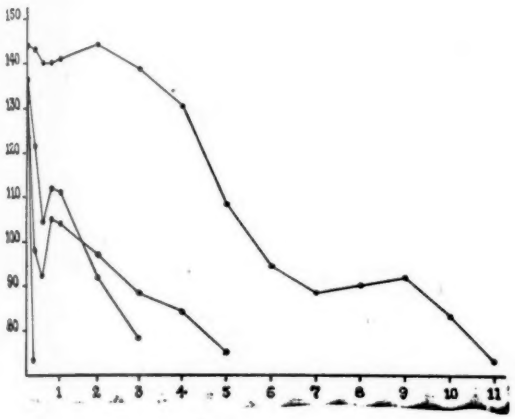


FIGURE 1.

giving the drug, with an average drop of 24 beats. All the patients felt better within half an hour after receiving the medication.

In no case were there any untoward reactions. One patient had been partially digitalized without my knowledge. He received the usual dose, after which he experienced nausea and mild vomiting for two days. Fahr and La Due[13] gave full digitalizing doses (8 cc.) Lanatoside C intravenously to 4 patients who, unknown to them, had previously been completely digitalized. They developed only transient nausea. Hrenoff[14] and Sokolow and Chamberlain[15] also found no evidence of toxicity when the drug was given intravenously.

For comparison of Lanatoside C with the glycosides of *D. purpurea* regarding rapidity of action and safety following intravenous injection, the study by Pardee[16] offers an acceptable basis. His work included the use of digalin, digifolin and digiton. He found definite slowing of the heart fifteen minutes after the drug was given, with a greater decrease in the next fifteen minutes. From then on for two or three hours the rate became slightly lower, remaining at that level for twelve to twenty-four hours, with some increase after that time. The dosage was 1 minim per pound of body weight. Pardee advised, however, that the doses be given in fractional amounts rather than in single doses for fear of toxicity. Many of his patients had apical rates of between 90 and 110, which are much lower than any of those in this series. Although there was a fairly rapid drop within thirty minutes in his cases, no rate dropped below 80 in that period. In general, the rapidity of drop was not so marked as that observed with Lanatoside C. This is in accord with the findings of Sokolow and Chamberlain.[15]

## SUMMARY

Intravenous digitalis therapy may be necessary when rapidity of action is desired and when the patient is unable to take medication by mouth, owing to nausea and vomiting or to unconsciousness. Lanatoside C (Cedilanid) given intravenously has a wide margin of safety, requires no fractional dosage, and is rapid in action. It appears to have a definite advantage over the glycosides of *D. purpurea.*

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# MEDICAL PROGRESS

## TREATMENT OF SINUSITIS

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THE purpose of this report is to present certain points in the recent literature concerning the treatment of sinusitis that seem sufficiently important to emphasize, without attempting to catalogue all the papers on this subject. In common with a good many other medical problems, the treatment of the diseases of the paranasal sinuses is the object of a good deal of controversy. In an article by Bowers[1] entitled "Practical Points in the Diagnosis and Treatment of Sinusitis" many of these controversial points are mentioned. He notes the lack of agreement among laryngologists and urges that the following points be borne in mind:

Geographic location, since infections act very differently in different parts of the country.

The type of practice (institutional, clinic or private).

The reputation of the author. Is he mightier with the pen than with the scalpel? What is his technic in handling situations? For example, he may state flatly that inflation of the ear is of little value. Does he know how to inflate an ear? If he does, his statement is worth careful consideration; if not, it is worthless. The same thing holds true in all nasal treatment; the skill and dexterity of the operator play a great part in the success or failure of any given procedure.

The author's criterion of success and the measuring rod with which he approaches his work. Definitions vary; what one man calls chronic is not so regarded by another, and ideas as to what constitutes a cure differ widely.

### ACUTE SINUSITIS

Practically all authors agree on a conservative approach to the problem of acute sinus infection. In the early stages, rest in bed, applications of heat and the mildest local application possible to obtain drainage are all that is necessary. Henley[2] advises rest, warmth, vasoconstrictors, vitamin C, chemotherapy, and avoidance of surgery in cases that are not complicated by orbital or intracranial extension. In selected acute cases he uses nasal irrigations consisting of a solution of ephredrine or Neo-synephrine. He also advocates bacterial antigens, foreign proteins and sulfonamide drugs. In cases in which there is inadequate drainage, after giving the above conservative methods a fair trial he punctures and irrigates the antrum. He is not certain that short-wave and x-ray therapy are of value in the acute congestive stage. In fulminating infection with extension he advocates chemotherapy as an adjunct to surgical drainage. Wishart[3] in considering sinusitis in children also advocates conservative treatment unless complications threaten.

As is generally known, the treatment of acute cases has become much more conservative than formerly. Most sinuses subside in the early stages under simple nonsurgical treatment. The treatment of an acute sinus that is not draining presents another problem. If it does not drain, a reaction takes place in the lining membrane and in the surrounding bony wall. The disease passes from the acute to the chronic stage, and so long as acute infection exists there is danger of an orbital complication, osteomyelitis of the frontal bone or extension into the meninges. In the case of an acute nondraining maxillary sinus, a puncture through the lower meatus or irrigation through the natural ostium is indicated. From a study of the anatomy of the natural ostium Bowers[1] concludes that irrigation of the antrum by this route is neither impracticable nor impossible. He thinks that the antrums are retainers of nasal infection and form the keystone to most nasal pathology. In the case of the frontal and ethmoid sinuses the question of technic arises. In general, intranasal operations in acute ethmoiditis and frontal sinusitis are frowned on. Certainly where there is evidence of extension into the orbit the intranasal approach seems illogical. With more familiarity regarding the external approach and a greater knowledge of the cause of failure in frontoethmoidal surgery, much more satisfactory results are being obtained.

There are some exceptions to the above statement. Brown[4] believes that in children frontal sinusitis calls for intranasal ethmoidectomy, and adds that there should be no interference with the nasofrontal duct. Snow[5] discusses orbital complications in simple disease, and concludes that early operation and an external approach are necessary.

Boies[6] brings up again the question of a simple trephining operation for drainage of the frontal sinus in selected cases. These patients suffer from an empyema of the frontal sinus, and drainage under conservative care seems inadequate. Inas-

The articles in the medical-progress series of 1941 have been published in book form (*Medical Progress Annual*. Volume III. 678 pp. Springfield, Illinois: Charles C Thomas, 1942. $5.00).

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much as in these cases trauma may cause osteomyelitic complications, it is extremely important to obtain drainage. Boies advocates a simple trephination through the floor of the sinus early in the course of the disease.

### Chronic Sinusitis

In chronic sinusitis changes have already taken place in the mucous membrane of the sinus and to some extent in the surrounding bony wall, so that the disease perpetuates itself. The primary factor may be poor nasal drainage during the acute stage or repeated nasal infections that in the course of time have left their mark. Some writers consider other causes, such as dietary disturbances, endocrine imbalance and allergy.

Smith[7] discusses the management of the nose and the paranasal sinuses in asthma, and advocates treatment by the allergist and the internist before local measures are undertaken. The allergist's study must be thorough to be effective, and requires the co-operation of the rhinologist, especially in children. Smith advises against surgery until the allergy factor is controlled, and even then favors conservative surgery.

Solis-Cohen[8] discusses the use of specific vaccines in the treatment of chronic sinusitis, but he discourages their use for the prophylactic treatment of acute exacerbations of chronic latent sinusitis, pointing out that severe and harmful reactions may ensue should the organism be the same as that present in the sinus. He first injects intracutaneously in the forearm four test doses. One consists of 0.05 cc. of plain broth, and the other three, 0.05 cc. of the broth culture so diluted that the first contains 1,000,000 to 50,000,000 organisms, the next a tenth to a thousandth of this number, and the last a tenth to a thousandth of the second dose. The smallest amount that gives a slight local reaction is injected therapeutically. Each subsequent dose is regulated in accordance with the general and local reactions produced by the preceding one. A dose is given every five days. Solis-Cohen points out that vaccine therapy may be of no benefit to patients with chronic sinusitis when there is suppuration in a sinus that is not draining or when the sinusitis is secondary to an untreated primary focus of infection, such as diseased tonsils.

In considering surgery for chronic sinusitis, the general picture must certainly be considered. An effort should be made to determine whether the sinusitis is the sole disease from which the patient is suffering, or is part of a more complicated picture, such as sinobronchiectasis or sinusitis and bronchial asthma, or focal evidence of infection in other parts of the body.

In an article by Harper,[9] certain general symptoms are given greater emphasis than heretofore. These are fatigability and mental depression. Fatigability is especially important in aviation medicine. Bullwinkel[10] mentions sinusitis as a cause of fatigue. It has long been known that the average patient with even a moderate degree of chronic sinusitis feels below par and finds it difficult to keep up in his work, which, for an aviator, may be fatal. The same author in discussing nasal accessory sinusitis in aviation medicine states that patients in whom chronic maxillary sinusitis has been treated by the so-called "radical antrum" or Caldwell–Luc operation may be accepted for service, but those who have had a radical frontal or ethmoid operation are dangerous risks. Harper[9] advocates the Caldwell–Luc operation for chronic maxillary sinusitis, and points out that there is a marked improvement in well-being following this operation, especially in children. In cases of ethmoiditis he approaches the ethmoid sinus through the antrum by the transantral route. In discussing failure in radical surgery, he points out that inefficient treatment is the most frequent cause. Residual bony infection may likewise result in a recurrence of sinusitis. Chronic infection of the sinus alone is comparatively rare. In cases of multiple sinus infection the key to the situation is the ethmoid sinus. This is especially true in frontal sinusitis. In a study of failure in frontal-sinus surgery, I[11] found that incomplete ethmoidectomy, as well as failure to remove the frontal-sinus floor completely, was a common cause of reinfection. When one considers the anatomic relations of the ethmoid labyrinth, especially noting the orbital extensions of the ethmoid, the importance of this sinus becomes apparent.

Bowers[1] evaluates certain standard operations. He recommends the Caldwell–Luc operation when there are marked constitutional or tracheobronchial symptoms together with pronounced roentgenographic evidence of disease. The technical steps that he emphasizes are as follows:

Remove every vestige of membrane.

Make as large an opening as possible into the inferior meatus.

If necessary remove a portion of the inferior turbinate to ensure that the opening is not blocked by the turbinate.

Remove the ethmoid cells through the antrum if they are diseased.

Pack the opening into the inferior meatus with gauze, but do not pack the antrum.

Remove the gauze by degrees during the next five days, thus producing some bleeding and thereby adding to the clot in the antrum.

Do not irrigate; use dry agents only in aftertreatment. Dust sulfanilamide powder into the nose and antrum cavity.

At the Massachusetts Eye and Ear Infirmary great care is insisted on to avoid injury to the inferior turbinate, and removal of a portion of it is considered inadvisable. The advantage of a postoperative clot is not clear. Sulfanilamide powder is of great advantage at the time of operation when dusted into the denuded bony cavity. Bowers[1] speaks of the replacement of the mucous membrane lining by a fibrous tissue that may obliterate the antral cavity. Birdsall,[12] in an article discussing the treatment of sinusitis in recruits, points out that postoperatively the antrum shows a thickening due to this formation of fibrous tissue. He cautions that x-ray evidence in operative cases is not a criterion for evaluating the status of the sinusitis in a recruit. The only sign of cure, according to him, is the relief of symptoms.

Patterson[13] discusses external operation on the nasal sinuses. In considering the surgical approach to the frontal and sphenoid sinuses he emphasizes the importance of the ethmoid labyrinth. The frontal sinus, he states, should always be explored through its inferior wall, the extent of the operation depends on the severity of the disease and the anatomic and pathologic conditions found after the sinus has been opened.

This brings up the question of the type of operation to be performed. There are three classic operations: the Lynch frontal sinus operation, consisting of the removal of the entire floor of the frontal sinus, together with its lining, and complete ethmoidectomy and exploration of the sphenoid sinus if it is involved; the Killian operation, in which the supraorbital bridge is preserved with its periosteum intact; and the obliterative operation, in which the floor, the anterior wall, the entire mucous-membrane lining and often the posterior wall of the frontal sinus are removed.

Patterson[13] in discussing the obliterative operation advocates the removal of the anterior and inferior wall, together with all the mucous membrane covering the posterior wall. From the experience at the Massachusetts Eye and Ear Infirmary this removal of the mucous membrane is considered essential, since the overlooking of even a small area of mucous membrane inevitably leads to the formation of a mucocele.

Peele and LeJeune[14] mention a direct method for irrigation of the sphenoid sinus by injection with an opaque medium. They discuss the symptoms of sphenoiditis, which are worth mentioning here. In an epidemic of influenza in New Orleans in March, 1940, there was a high incidence of debility due to sphenoiditis. The symptoms noted among these patients were as follows: headaches radiating from the eyes to the occiput and down the back of the neck and occasionally to the mastoid process; nasal discharge and obstruction; anosmia; aural symptoms due to disturbances of the Eustachian tube by postnatal discharge; blurred vision, photophobia and repeated changes in refraction; retrobulbar neuritis; and changes in mental attitude, believed by the writers to be constant and characteristic in chronic cases, and involving depression, memory defect and irritability. A great many of the patients with mental symptoms were labeled "neurotics," and the diagnosis was occasionally confused with brain tumor. Peele and LeJeune advocate irrigation and, in the cases that cannot be cleared up by this method, operation.

In studying injuries of the frontal and ethmoid sinuses, Calvert and Cairns[15] analyzed 128 cases of traumatic injury to the frontal and ethmoidal sinuses. These cases are interesting from an etiologic standpoint, since they arose from war conditions in Great Britain. Some of the injuries were received in traffic accidents during blackouts, and others were a direct result of bombing. The chief causes are listed as follows: motorcycle accidents (44 per cent), motorcar collisions (19 per cent), being struck by motorcars (9 per cent), bombing, machine-gunning and so forth (8 per cent) and airplane accidents (6 per cent). Seventy per cent of the injuries consisted in compound fracture into the nose or through the skin. In 35 per cent of the series there was anosmia. Twenty-one patients had cerebrospinal rhinorrhea. Of these, 11 were treated conservatively, with 7 recoveries, and 10 were operated on, with 9 recoveries. Nine patients had aerocele. Of these, 3 were treated with a dural graft and recovered. Six were treated conservatively, with 4 uncomplicated recoveries. One patient died from meningitis and 1 recovered from it.

In discussing the operative procedure, this author states that if the patient is in good condition, the dural tear should be repaired immediately. If he is in poor condition he should be treated for shock and given chemotherapy and the wound should be cleaned of dirt and débris under local anesthesia. In gross fractures radical removal of the walls of the sinuses should be done. Calvert and Cairns point out, however, that infection of the sinuses was infrequent in these cases.

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# CASE RECORDS OF THE MASSACHUSETTS GENERAL HOSPITAL

## Weekly Clinicopathological Exercises

FOUNDED BY RICHARD C. CABOT

TRACY B. MALLORY, M.D., *Editor**

BENJAMIN CASTLEMAN, M.D., *Acting Editor*

EDITH E. PARRIS, *Assistant Editor*

## CASE 29411

### PRESENTATION OF CASE

*First admission.* A thirty-four-year-old housewife entered the hospital because of fainting spells and smothering sensations.

Thirteen months before admission the patient caught a cold, which was followed by a persistent cough, wheezing and a smothering sensation in the chest. The wheezing was inconstant and improved considerably after she got rid of her dog; the smothering sensation, however, persisted so that at times she had to rush to the window for fresh air. She developed extreme nervousness and emotional lability. The cough continued, and three months before admission she noticed that she sweat freely, especially at night. There was no fever or hemoptysis, but she had lost 50 pounds in three months.

At the age of thirteen, she bore an illegitimate son, the father being her brother-in-law. A second pregnancy terminated in an abortion. At seventeen she was operated on for "pus tubes." At eighteen she tripped while dancing and fell, injuring her back and fracturing her coccyx, for which she was hospitalized a year. At twenty-two, while unhappily married, she developed attacks of unconsciousness, which had continued to date. The attacks were preceded by a sensation of falling through space; they lasted from two to five minutes and were followed by a "low feeling."

The patient's father died of Miner's asthma and "leaking valve," and her mother of a "stroke."

Physical examination showed a well-developed and well-nourished plump woman lying quietly in bed. The lungs were clear. The heart size was not made out. A short blowing systolic murmur was heard in the third interspace to the left of the sternum. The abdominal and pelvic examinations were essentially normal. The reflexes were hyperactive. The pupils were regular, equal and contracted, even in the dark; they reacted to light and accommodation.

The blood pressure was 138 systolic, 88 diastolic. The pulse was 90, and the temperature and respirations normal.

*On leave of absence.

The red-cell count was 4,640,000, with a hemoglobin of 15 gm., and the white-cell count 17,700, with 70 per cent neutrophils. The urine and stools were normal. A blood Hinton test was negative. The cerebrospinal fluid was normal and gave a negative Wassermann reaction. The blood bromide was normal, and all skin scratch tests were negative.

Shortly after finishing the physical examination, following an uneventful trip to the bathroom, she was found unconscious in bed with the eyelids fluttering and the pupils still contracted, although they reacted to light. All attempts to rouse her were unsuccessful. Her pulse and blood pressure were not affected. There were no tonic or clonic movements and no spasticity or changes of reflexes. No effect of carotid pressure on the heart rate could be demonstrated. She gradually regained consciousness, complaining of feeling poorly and of a sensation of falling through space. On the following day she vomited frequently and had two "spells." There were rapid mood changes from hilarity to extreme depression.

A roentgenogram of the chest revealed enlargement of the heart to both sides in the region of the ventricles and auricles. The pulsations were normal. The hilar vessels were surprisingly normal. A gastrointestinal series showed markedly thickened gastric rugae and extensive pyloric spasm but was otherwise normal. An electroencephalogram was within normal limits.

She was placed on Dilantin, 0.1 gm. three times a day, and phenobarbital, ¼ gr. four times a day, following which the attacks stopped. The patient was discharged on the thirteenth hospital day with a diagnosis of epilepsy.

*Final admission* (thirteen months later). The patient re-entered the hospital because of dyspnea. Her condition had remained about the same but dyspnea had progressively increased, especially after periods of increased activity. Six months before entry she was seen by her physician, who found considerable cardiac enlargement and an enlarged liver. There was no edema. An electrocardiogram revealed normal SR waves. The PR interval was 0.20 second, and the QS interval 0.14 second; the P waves were unusually broad; the QRS complex was slurred in all leads; $T_1$ and $T_3$ were inverted; there was evidence of left bundle-branch block. The patient was given digitalis, but owing to signs of toxicity the dose was finally established at 1.5 gr. five times a week. She was placed on a reducing diet and lost 20 pounds in six months. Five months before entry she coughed up slightly blood-streaked sputum, and once a definite presystolic murmur was heard. One month before admission she began to notice abdominal

swelling and pain in the right lower quadrant. Five days before admission she caught "cold" and developed anterior and posterior pleural pain on the right, which subsequently disappeared. There were no chills or fever. For several months she felt food stick in the esophagus at about the level of the third rib.

Physical examination showed essentially the findings recorded at the time of the previous admission, with the following additions. She was dyspneic, even while sitting. The heart was 4 cm. to the right of the midsternal line and 3.5 cm. outside the left midclavicular line. The sounds were of good quality but distant at the apex. The mitral first sound was not snapping, and the pulmonic second sound was greater than the aortic. The lungs were clear except for a few moist inspiratory rales at the right base. The liver dullness extended from the fourth rib to 7.5 cm. below the costal margin in the right anterior axillary line; it was 9 cm. below the right costal margin in the midclavicular line, 10 cm. below the xiphoid, and 11 cm. below the left costal margin.

The blood pressure was 140 systolic, 68 diastolic. The temperature was 97°F., the pulse was 80, and the respirations 20.

The white-cell count was 13,200, and the hemoglobin 14.3 gm. The urine showed a + test for albumin and many bacteria. The vital capacity was 1000 cc. (33 per cent of normal). An electrocardiogram showed normal rhythm, with a rate of 80; the QRS complexes in Leads 1, 2 and 3 were wide; $T_1$ was inverted, and $T_2$ and $T_3$ upright. The sedimentation rate was normal. The prothrombin time was 28 seconds (normal, 17 seconds). The hematocrit was 53 per cent. The nonprotein nitrogen was 16 mg. per 100 cc., and the cholesterol 170 mg.

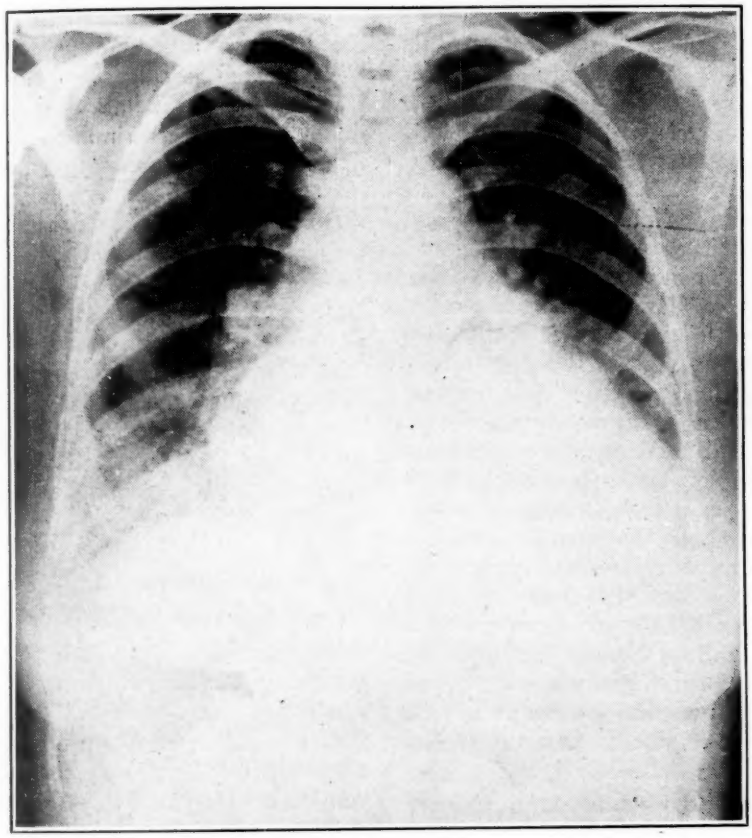

FIGURE 1. *Roentgenogram of Chest.*

A roentgenogram of the chest revealed marked enlargement of the heart since the first admission (Fig. 1). The enlargement was diffuse. The pulsations were small and rapid. There was enlargement of what was probably the right ventricle. There was a shadow in the left oblique view that could be interpreted as an infarct in the region of the second interspace anteriorly. The diaphragm was low on both sides but showed normal respiratory motion, and there was a small amount of

fluid in the right costophrenic angle. The left main bronchus was elevated. Fluoroscopy was unsatisfactory.

The day after admission, when on the way back from the X-ray Department, she had an attack of unconsciousness similar to those already described. On the evening of the second hospital day, she complained of a sore right shoulder, and on the following morning she began to have pleural pain at the right base anteriorly and posteriorly. She developed a cough productive of bright-red, blood-streaked, mucoid sputum. There was dullness at the right base posteriorly, with suppressed breath sounds and fine rales. Similar rales and a suggestion of a pleural friction rub were heard anteriorly. The lower extremities were not edematous or tender. Fluoroscopy following this attack showed an area of density in the apex of the middle lobe and a small amount of fluid in the right pleural cavity. There were linear areas of density in the left midlung. For the next two days she complained of nausea and vomiting and severe hypogastric pain, which was finally relieved by a copious, light-brown, nonbloody, unformed bowel movement. On the third hospital day she was given 8500 units of heparin intravenously and 300 mg. of dicoumarin by mouth, followed by 10,000 units of heparin and 200 mg. of dicoumarin the next day and 2000 units of heparin the third day. On the same day a blood Hinton test was reported negative but the Wassermann reaction was positive. Two repeated Hinton examinations were positive.

On the fifth hospital day the patient's legs were carefully examined for a possible source of pulmonary emboli. Slight pain was elicited on dorsiflexion of the right foot but no swelling or cyanosis was present. On the following day, during the intravenous injection of heparin, she became unconscious for three minutes, at which time she was completely flaccid and moderately cyanotic without any convulsions. The pulse was slow and strong.

For the next five days she had repeated attacks of pleural pain on one or the other side, with rales and dullness, cough and bloody sputum. The prothrombin time on the eleventh day was 87 seconds (normal, 17 seconds) and the hematocrit was 62 per cent. On the ninth and tenth hospital days she had several attacks of unconsciousness lasting four or five minutes each, similar to those seen previously. The chest pain continued without much change. Bloody sputum and a friction rub were inconstant, but rales and decreased breath sounds persisted over the bases.

On the thirteenth hospital day, eleven days after a menstrual period, she had vaginal bleeding, at first slight but then profuse. This persisted for three days. On the same day she developed severe pain in the right anterior chest, with cough and bloody sputum. The prothrombin time was 98 seconds (normal, 17 seconds), and the hematocrit 54 per cent. She was placed on potassium iodide, 20 drops daily. During the next twenty-one days she had two other attacks of pain in the left chest, as well as epigastric pain, with cough and bloody sputum. She also had four or five attacks of unconsciousness similar to those previously described. The prothrombin time had decreased to 31 seconds, and the hematocrit was 55 per cent.

During her entire illness the blood pressure remained about 150 systolic, 75 diastolic, the pulse about 90, the respirations 25, and the temperature between 99 and 100°F. The urine usually showed a ++ test for albumin and some red and white cells. She received dicoumarin and heparin almost daily, as well as eight injections of Mercupurin and thirteen doses of digitalis, 1.5 gr., over twenty days.

On the twenty-first hospital day the patient was found dead.

## Differential Diagnosis

Dr. Earle M. Chapman: The first paragraph of the history seems to indicate that the patient had pulmonary disease. Anything that leads to night sweats and a 50-pound weight loss should be considered a rather serious illness. The cough and wheezing that improved by getting rid of her dog make one think that this was an asthmatic episode. I do not know that we should call it asthma, however.

The past history offers tremendous psychiatric possibilities. One could talk on that for the rest of the hour, but I am going to skip over it and say that such events are apt to lead to any complication, especially asthma! The fainting attacks were not psychiatric manifestations but were quite classic for epilepsy. She had an aura, and then a depressed feeling after the attack.

The patient is described as being plump after losing 50 pounds, so that she must have been obese at one time. I take it that the pupils were small even in the dark. I should like to know the size of the pupils. Of course, Argyll-Robertson pupils are small, being under 2 mm. in diameter.

Dr. Benjamin Castleman: They measured 3 mm.

Dr. Chapman: They were not small enough for Argyll-Robertson pupils.

I wonder if ineffectual straining at stool had anything to do with the attack of unconsciousness that occurred at the time of the first admission.

I am not aware that people with epilepsy are precipitated into an attack by straining at stool, but the point is raised.

The fact that the pulse and blood pressure were not affected during these attacks is important and leads me to believe that she did not have a carotid-sinus syndrome, Adams–Stokes's disease or some other sort of cardiac arrhythmia that was responsible for the unconscious spells.

After having entertained the suggestion that these attacks were epileptiform, I am surprised to find that the electroencephalogram was normal. This does not help us to establish a diagnosis, but I am sure that one can have epilepsy without a positive electroencephalogram.

The electrocardiogram indicates rather severe myocardial injury and suggests the possibility that this person had had coronary occlusion with myocardial infarction of the anterior wall. One thinks of damage to the myocardium by infection, but there is nothing in the history to indicate this.

The presystolic murmur must be accepted for a fact. It is here in print, and it is an important observation. I presume it was heard at the apex.

I interpret the blood spitting five months before entry as the first sign of pulmonary infarction. The abdominal swelling and pain suggest congestion of the liver, edema and beginning heart failure. The dysphagia is a surprising symptom. There was atypical, generalized enlargement of the heart to both sides. Apparently no murmur was heard later on. The pulmonic second sound was greater than the aortic, which, at thirty-four, is abnormal. The other signs lead one to believe that the patient had congestion in the pulmonary circuit. I assume that there was no aortic regurgitation, since no diastolic murmurs are mentioned and the diastolic pressure was 68.

The elevation of the left main bronchus is a significant observation. On consultation with my friends in the X-ray Department they assured me that the only thing that leads to that is enlargement of the left auricle, which we know was present here. Apparently the right auricle seldom, if ever, leads to elevation of the bronchus. The enlargement of the left auricle fits in with the dysphagia, since impingement on the esophagus would probably lead to difficulty in swallowing at that level.

From the story of the attacks of pain and treatment it seems likely that the patient was suffering from some type of intravascular thrombosis. It does not disclose the source, and we have not enough evidence to say definitely. It is interesting that the first Hinton test was negative and a later one was positive.

"Slight pain was elicited on dorsiflexion of the right foot but no swelling or cyanosis was present." I think they are telling us that the Homans's sign was positive — just a little, possibly, but positive nevertheless.

"For the next five days she had repeated attacks of pleural pain on one or the other side, with rales and dullness, cough and bloody sputum." She apparently was having showers of pulmonary infarcts.

Reconstruction of this case is difficult, to put it mildly. The patient seems to have had epilepsy of twelve years' duration, and under the standard treatment for that disease the attacks cleared up and she was much better. The epileptic attacks seem to have been separate from the other disease, which was chiefly pulmonary. She had asthmatic-like symptoms, with a cough, for thirteen months; then five months before the last entry she had an episode of what sounds like pulmonary infarction, and one month before entry the onset of congestive heart failure. The strange thing is that apparently she developed a positive Hinton test between the two admissions, so that sometime in the thirteen months before the last entry she must have acquired syphilis or one of the reports was a laboratory error. One wonders if changes in the blood serum, owing to some intravascular process, which she obviously had, could have caused a change in the proteins of the blood that would have resulted in this positive reaction. We know that several things cause false positive tests, such as serum sickness and recent vaccination.

As I have said, the problem here is, if possible, to decide what type of heart disease this patient suffered from and what was the mechanism of the failure that led to an afebrile condition with showers of pulmonary infarcts. Against subacute bacterial endocarditis are two facts — the patient had no fever and the hemoglobin was 14 gm. With prolonged endocarditis a fever and significant anemia are almost the rule. The results of blood cultures are not mentioned.

DR. CASTLEMAN: They were not done.

DR. CHAPMAN: It seems that there was a thrombosis in the vascular system, and we have some evidence for believing that it was in the veins, because of the positive Homans's sign.

DR. LAURENCE L. ROBBINS: The films show diffuse enlargement of the heart, but I do not believe that I can help in localizing the type of lesion. The enlarged right ventricle is this shadow on the oblique film. The small shadow in the second interspace is consistent with an infarct. There is relatively little elevation of the left main bronchus.

DR. CHAPMAN: With this evidence it is diffi-

cult to make what would be an easy diagnosis — rheumatic heart disease with mitral stenosis. In support of this we have the following facts: the typical sort of cardiac enlargement, a presystolic murmur, a loud pulmonic second sound and changes in the electrocardiogram that indicate myocardial damage. There is nothing in the history that suggests rheumatic infection, and that makes the diagnosis unlikely to me.

Did she have congenital heart disease, with pulmonary-valve disease, pulmonary stenosis or an interauricular septal defect producing changes in the electrocardiogram? The murmur described was in the third left interspace, and it was the only murmur described while she was in the hospital. Blood cultures should certainly have been taken. There is a possibility that the gonococcus was involved, which frequently attacks the pulmonary valve.

The third thing to consider is coronary heart disease with infarction of the anterior wall which the electrocardiogram indicates. I cannot possibly make this diagnosis on clinical grounds.

The fourth choice is syphilitic heart disease. She had a rather stormy sexual history, with certainly one venereal infection and perhaps another.

This woman must have had a thrombus somewhere in the venous system or in the right heart. I do not believe, however, that she had thrombosis in the veins of the leg. She had no edema, and no symptoms pointing to the pelvic veins or the deep leg veins as being the cause of the emboli to the lungs. So I am going to assume that they arose in the chambers of the right heart, probably the ventricle but possibly the auricle.

Of these four types of heart disease I do not see how one can make a definite diagnosis on the evidence at hand. Syphilis rarely attacks the right side of the heart and certainly there was no sign that the patient had aortic disease or aortic regurgitation, which is the usual pathologic change in syphilitic heart disease. Therefore, I must fall back on some other type, and the commonest of these is rheumatic heart disease. Dr. Robbins told me that elevation of the left main bronchus is seldom, if ever, seen with right-heart enlargement, such as one would have with pulmonary stenosis: Sosman's article[1] establishes this quite clearly. Hence, my final diagnosis is rheumatic heart disease, with mitral stenosis, possibly pulmonary stenosis and certainly thrombosis on the right side of the heart.

DR. CONGER WILLIAMS: The first time we saw the patient on the last admission she had not had a positive Hinton test. Since she had cardiac enlargement without any murmurs and, so as far as we could tell, without a previous etiologic factor, we considered the possibility of Fiedler's myocarditis,[2] which gives a picture much like this and sometimes lasts as long as one and a half years. The repeated episodes of pulmonary embolism, which are caused by mural thrombi in the right heart that break off and go to the lung, are consistent with Fiedler's myocarditis. It was possible that she had had syphilis for twenty years. She was first exposed at thirteen. We had no evidence for aortic disease and were never able to hear a diastolic murmur. When the Wassermann test was reported positive, we considered an even more improbable diagnosis, — diffuse syphilitic myocarditis, — and we had to leave it at that and await the autopsy findings.

### CLINICAL DIAGNOSES

Fiedler's myocarditis?
Diffuse syphilitic myocarditis?
Multiple pulmonary infarcts

### DR. CHAPMAN'S DIAGNOSES

Epilepsy.
Asthma.
Pulmonary infarcts.
Rheumatic heart disease, with mitral stenosis and thrombosis in right side of heart and possibly pulmonary stenosis.

### ANATOMICAL DIAGNOSES

Syphilitic aortitis, with involvement of aortic valve and mouths of coronary arteries.
Occlusion of left coronary orifice.
Myocardial fibrosis.
Myocardial infarct, healed.
Cardiac hypertrophy.
Pulmonary infarcts, multiple.
Chronic passive congestion of lungs and liver.
Central necrosis of liver.

### PATHOLOGICAL DISCUSSION

DR. CASTLEMAN: The heart was symmetrically enlarged and weighed 610 gm. The entire aorta, but more marked in the ascending aorta and arch, showed the characteristic appearance of syphilitic aortitis. There were raised pearly-gray areas in the intima, such as one sees in the more recent type of syphilitic aortitis, surrounded by the chronic, more usual type of stellate scarring and linear "tree-barking." This was confirmed microscopically by the finding of marked elastic-tissue destruction in the media and lymphocytic infiltration around the vasa vasorum. The mouth of the left coronary artery was completely occluded, and that

of the right markedly constricted. The commissure between two of the cusps showed definite separation, indicating that syphilis had involved the aorta in the sinuses of Valsalva. There must have been some regurgitation, and I cannot understand why a diastolic murmur was not heard. Further evidence that there was regurgitation was the definite flattening of the trabeculae carneae of the left ventricle. There were numerous small grayish-white scars throughout the myocardium, and on the anterior wall a larger healed infarct on which an old organized thrombus was still present. Since the main left coronary ostia was completely occluded, the heart was being supplied by the right coronary artery, which was capacious and had formed a good collateral circulation with the left.

Numerous microscopic sections taken throughout the myocardium showed focal areas of scarring of the type not infrequently seen in a patient with coronary disease. There were no areas of lymphocytic, monocytic or plasma-cell infiltration to suggest a syphilitic myocarditis.

I have to interpret the case as being one of primary syphilitic aortitis with so much involvement of the ostia of the coronary arteries that the resultant anoxia had produced focal scarring of the myocardium. One might possibly think of a burned-out syphilitic myocarditis, but with the ostia of the left coronary completely occluded and the right somewhat narrowed there is sufficient reason for the myocardial fibrosis.

The lungs showed numerous infarcts of various ages. There was no source on the right side of the heart, and I believe that it was in the deep veins of the leg. The liver showed marked central necrosis and evidence of congestive heart failure.

DR. JACOB LERMAN: Was there anything in the brain?

DR. CASTLEMAN: We did not have permission to examine the brain.

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## CASE 29412

### PRESENTATION OF CASE

A twenty-six-year-old man entered the hospital complaining of pain and stiffness in the back of three months' duration.

The patient stated that he was born with an open spina bifida but that it had closed over. Soon after birth, his mother noted a thin-walled sac over the lumbar region posteriorly. This was treated with alcohol sponges and it shriveled up soon after. When the patient was fourteen months old, x-ray examination of the lumbar spine and pelvis showed no bony abnormality and there was no positive evidence of spina bifida.

The patient was reasonably well until three months before entry when, while playing golf, he

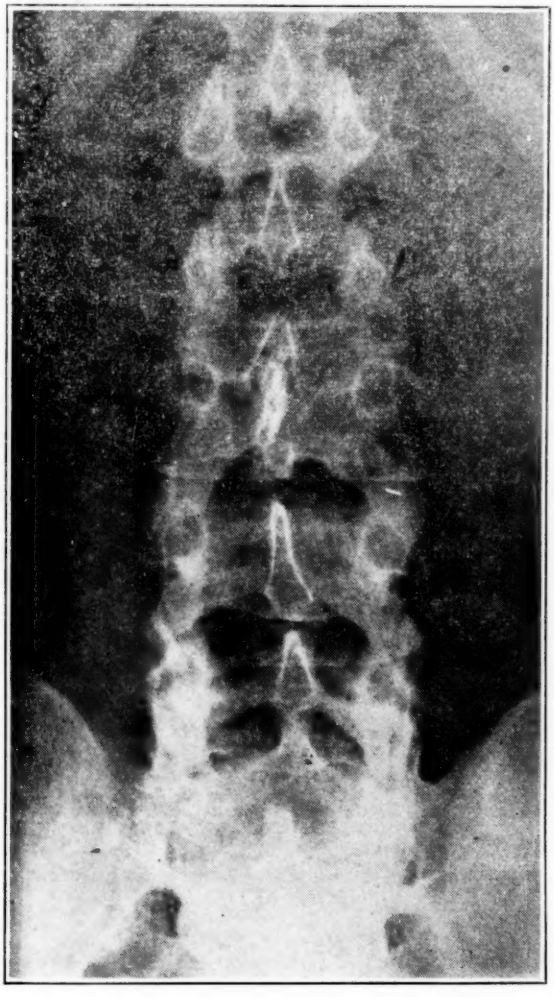

FIGURE 1. *Roentgenogram of Lower Spine.*

noticed some stiffness in the midlumbar region. The following day each time he drove a golf ball he felt what he termed a "pull" in the region of the left sacroiliac joint. A constant cramp-like pain was noted in the same region and this continued until admission. Within a week of the onset of this pain he noted that, when rolling over in bed or when suddenly getting up, he felt a sudden "flash of pain" radiating to the left sacroiliac region. An osteopath treated him with prostatic massage and hot enemas; within two or three weeks the flashes of pain disappeared, but the constant pain grew progressively worse. Four weeks before admission, while being taken to a commu-

nity hospital by ambulance, he felt something hard pressing into his back. That evening all the toes of both feet began to feel numb, and within four or five days the numbness had spread to include all of both feet. Three weeks before entry he noted that his legs were somewhat shaky and weak, and a few days later he was not able to control his legs as well as he had formerly. At about this time he noted numbness over the knees, and rotating his head or pressing upon something with his feet always led to lumbar discomfort. On two or three occasions during the two weeks before entry, when excited, he became incontinent of urine and once, while laughing, incontinent of feces. His legs gradually became weaker, and he entered the hospital for therapy.

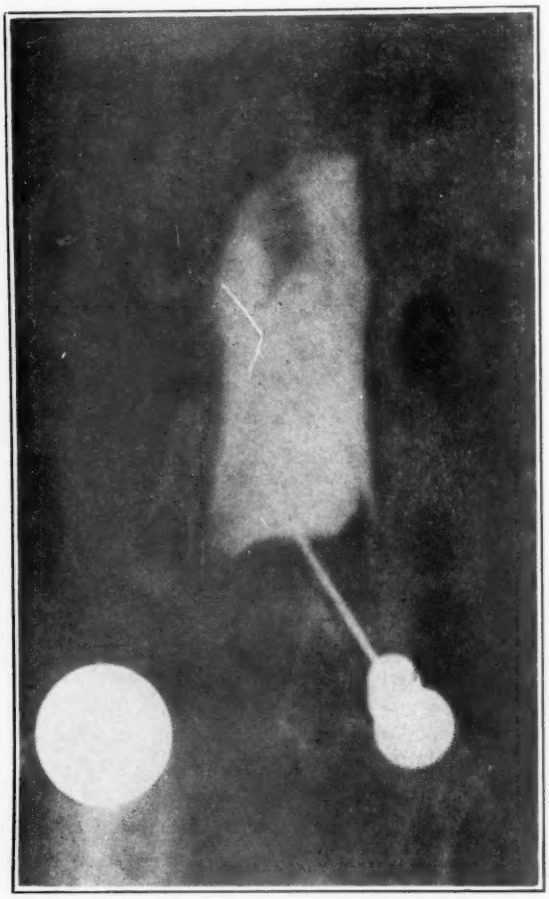

FIGURE 2. *Roentgenogram of Lumbar Spine following Injection of Lipiodol.*

Physical examination showed a well-developed and well-nourished man with an old spina-bifida scar and surrounding hair growth in the midlumbar region. Both legs were markedly weak. There was hypesthesia of both legs, the posterior aspect of the right thigh, the posterior aspect of the lower half of the left thigh and the medial aspect of each buttock, as well as over the sacrum and lower lumbar region. The left biceps reflex was greater than the right, and the right knee jerk greater than the left; there were bilateral ankle clonus and Babinski signs, more marked on the right. The lower abdominal and cremasteric reflexes were absent.

The temperature, pulse and respirations were normal.

Examination of the urine was negative. The blood showed a white-cell count of 6500, with 69 per cent neutrophils.

X-ray examination of the spine and pelvis showed marked widening of the neural canal throughout the lumbar region (Fig. 1). The intervertebral disk was absent between the second and third lumbar vertebras, and these two bodies were in contact with one another. There was no actual fusion or deformity of the bodies. An anatomical variation was present at the lumbosacral region — namely, a partially fused vertebra with large transverse processes. Although the canal was greatly widened, there was no erosion of the lateral masses, and no unusual soft-tissue shadow. There was no interference with the natural curves of the spine. Three cubic centimeters of lipiodol introduced into the spinal canal at the twelfth thoracic interspace showed complete obstruction about 1 cm. below the needle, with a cap formation (Fig. 2). No obstruction was met to the cephalad flow of lipiodol up to the seventh thoracic interspace. A blood Hinton test was negative. A lumbar puncture was negative, the total protein being 26 mg. per 100 cc.

An operation was performed on the seventh hospital day.

## DIFFERENTIAL DIAGNOSIS

DR. JOST MICHELSEN: It is obvious that this patient had a space-occupying intraspinal lesion opposite the first lumbar vertebra. The lipiodol injection at the twelfth thoracic interspace showed complete obstruction about 1 cm. below the needle, with a typical cap formation. Two questions remain to be answered. What type of tumor was found at operation? Did it occupy the extradural or intradural space, or both?

We are told that the spinal canal was greatly widened throughout the lumbar region without erosion of the lateral masses. The combination of such bony changes and cord compression has been described as a characteristic syndrome in extradural cysts.[1] These cysts supposedly develop from a congenital diverticulum of the dura mater

or a herniation of arachnoid through a congenital defect in the dura. The fact that this patient had other congenital abnormalities, which I shall discuss later in more detail, is also in favor of an extradural cyst. In only 1 of 10 cases reported so far, however, was the cyst located in the lumbar area; it usually occurred in the midthoracic region, and was more frequent in adolescents than in adults.[2] Moreover, enlargement of the spinal canal may be found with other extradural tumors as well as with intradural tumors.

The only conclusion that one may draw is that the lesion was of considerable size, since the widening involved all the lumbar vertebras. Therefore, neurofibroma and meningioma, the commonest intraspinal tumors, can be ruled out. Ependymomas are occasionally very large. They frequently occur in young adults, and the lumbar region is one of their favorite sites. They also produce widening of the spinal canal. One would expect, however, erosion of the dorsal portions of the vertebral bodies with such marked changes of the interpediculate spaces.

Aside from the enlargement of the canal the lumbar spine showed other abnormalities. The intervertebral disk between the second and third lumbar vertebras was absent. There was sacralization of the fifth lumbar vertebra. Probably both were congenital anatomic variations associated with the spina bifida that was observed at birth.

Concerning the spina bifida, no evidence of a defect in the closure of the vertebral arches was obtained on admission, but there was a scar in the midlumbar region surrounded by a local overgrowth of hair; furthermore, the peculiar neurologic findings could be well explained by traction exerted on the spinal cord as a result of its attachment in the lumbar region.

The neurologic findings were peculiar because a lesion whose upper level is opposite the first lumbar vertebra cannot produce pyramidal symptoms unless the normal relation of the vertebral column and spinal cord is disturbed. In adults the cord ends at the first or second lumbar vertebra. Even if the difference between the knee jerks is discarded, the bilateral ankle clonus indicates involvement of the pyramidal tracts at or above the fourth lumbar segment, which normally lies opposite the eleventh or twelfth thoracic vertebra.

The pyramidal disorder was probably produced by the tumor itself. If it was due to an associated lesion, a myelodysplasia, which is frequently associated with spina bifida, might have to be considered. The other and better alternative is to assume that the lumbar segments were lower than normal.

At an early fetal stage, the spinal cord occupies the entire length of the vertebral canal. Later, the spinal column grows more rapidly than the spinal cord. The latter, firmly attached to the brain, is drawn upward until the final well-known relation of vertebras and cord is attained. Attachment of the cord in the lumbar region, as a result of malformations there, exerts downward traction, which interferes with the normal adjustment, which, I believe, occurred in this patient. The cord was anchored at the site of the intraspinal malformation.

It is also justifiable to assume, in view of the absence of any other clue in the story, that the cord compression was due to a tumor that belongs in the group of congenital lesions. Its exact nature can hardly be determined on the basis of the available evidence. It was pointed out that the lesion probably was of considerable size. An extradural cyst is still a good possibility. A search in the literature revealed that cysts of congenital origin have also been found intradurally.[3,4] Both are uncommon. Intraspinal dermoid or epidermoid tumors are also rare in the lumbar region. Lipomas are not infrequently associated with spina bifida, but the whole picture is so puzzling that one may expect something unusual. That is as far as I can go.

### Clinical Diagnosis

Tumor of cauda equina.

### Dr. Michelsen's Diagnoses

Congenital space-occupying intraspinal lesion (tumor or cyst in the lumbar area).
Downward displacement of cord, with associated myelodysplasia?
Congenital abnormalities of lumbar spine.

### Anatomical Diagnosis

Epithelial ependymoma of filum terminale.

### Pathological Discussion

Dr. Charles S. Kubik: I shall read part of Dr. Mixter's operative note:

> There was a definite cleft in the third lumbar vertebra, by fusion of the spinous processes. On exposure of the dura, a mass could be made out, lying at the level of the lower edge of the first lumbar vertebra and the upper edge of the second. An extension of the dura into the cleft in the third lumbar vertebra was freed up, and the dura was opened throughout the extent of the laminectomy. An oval tumor, 3 by 0.5 cm., was found lying within the roots of the cauda equina, as seen through the dura. This tumor seemed to arise from some structure, probably the filum terminale, in the cauda equina. The roots of the cauda equina were matted together down to the level of the

spina bifida occulta — a normal finding in spina bifida occulta. There was adherence of a few posterior roots to the dura at the level of the spina bifida occulta. The mass was carefully dissected out but was ruptured during the later part of the dissection. It contained turbid, brownish fluid, and it seemed to be a cholesteatomatous cyst with some evidence of bleeding within the cyst. So far as I could make out, all the cyst wall was completely removed. The adherent nerve roots were freed from the dura lower down and were allowed to drop back with the rest of the cauda equina.

The tumor measured 2.5 cm. in length and 1.8 cm. in diameter. A large part of it consisted of a cyst, filled with pale-gray, semigelatinous material and lined with columnar and cuboidal epithelium. Some of the cuboidal cells were ciliated and contained a row of granules just beneath the ciliated surface. They resembled cells often found in a persistent central canal of the spinal cord in infants, and indicate that the tumor was an ependymoma.

DR. W. J. MIXTER: The patient made a good convalescence but the left leg was somewhat spastic at the time of discharge. Several weeks later he reentered the hospital following a bout of alcoholic excess; there were retention of urine, loss of rectal control and weakness and spasticity of the left leg. Examination suggested a large functional element but the spasticity, of course, could not be explained on that basis. A lumbar puncture performed below the level of the operative scar showed no evidence of block. He recovered gradually from this episode and was discharged with full control but still somewhat spastic.

I believe that the spasticity was probably due to some congenital anomaly of the dorsal cord rather than to traction on nerve roots, since no evidence of such traction was seen at the time of operation.

A recent report states that the patient is doing well, but I imagine that examination would still show evidence of spasticity.

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## WHEN JOHNNY COMES MARCHING HOME

"Never," said Winston Churchill, coining one of his most famous epigrams, "have so many owed so much to so few." He referred, of course, to the defense of England by the Royal Air Force in those desperately heroic days of 1940. The tribute was sincere — it was deserved — and no reward was offered.

We Americans, more mercurial and having suffered so much less, find it necessary to twist our eagle's tail feathers quite frequently, to hear him scream. True, we also have an aggregation of stout-hearted young men in our services who are rendering excellent accounts of themselves wherever they may be — in the air, on the land, on the restless surface of the ocean and in its waveless depths. They are for the most part modest youths, but by our very idolization of them we are making their eventual return to a civilian status doubly difficult.

It has been the grim duty of occasional generations of youths, in peace-loving countries, to forsake their normal ways of life and to assume the unaccustomed burden of arms, for a time, in defense of the peace that they have always cherished. Their countries owe them a great debt of gratitude for their sacrifices, but they owe them an additional and still greater practical debt — that of helping them eventually to return to useful citizenship so that they may at last enjoy the benefits for which they fought.

The very nature of the hero-worship, for the most part unwelcome and unsought, to which they are subjected tends to unsettle them and unfit them for the necessary readjustment to life on Main Street. As one of our more youthful senators recently remarked to the personnel of a bomber station somewhere in England, "When you come back there'll be nothing too good for you!" We all agree with the enthusiastic young senator, but we wish that his vague promise might have been left unvoiced, and we should like, incidentally, some clear exposition of what we really do owe our men when they return from their complex battle fronts.

The discharge of this debt should certainly assure them peace and security, for that they will have won for everyone, but above all it should extend the opportunity to become rehabilitated as useful, contented, contributing members of a society that they have helped not so much to preserve as to remake, we trust, on a better plane. We do not want them to have a month of adulation followed by a long period of idleness and gradual deterioration punctuated by bonuses, nor do we have the present intention of forcing this year's

heroes back, next year, into the adolescent's social and economic status — although in the past this also has been done.

The conspicuous advertisement of a well-known industry now engaged in war work features the thoughts of a young bombardier projected forward to the time when his last bomb is dropped and "tyranny is purged forever from the world." Then he will return to his country and his home, where he wants to find everything exactly as he had left it — even to the missing picket in the fence. Here we have pictured, with the misleading cleverness of the copy writer, the crystallized nostalgia of the boy who is longing for his home as he had known it, with all its faults and its imperfections. This may be what he believes that he is fighting for, but actually it must not be. We cannot let him waste his time and risk his life to preserve a *status quo*, nor are we at home leaving our fences unrepaired for him to come home and hang over. Our hopes must be that out of a sorry and shaken world will emerge, through his efforts and our own, a brave new one in which each will have a part to play. That is the best that we can offer our returning men when the time comes, and it will not be too good for them!

## AN OPPORTUNITY

The Boston School Committee has taken a most significant forward step by creating a new post, that of director of school cafeterias, and by offering a salary that is commensurate with the responsibilities of the office. The required civil service examination having been held, the names of the three candidates at the top of the list have been certified to the School Committee. It remains only for the committee to appoint one of these persons.

In making its selection, the committee incurs a grave responsibility because of the great importance of the school-lunch program to the many thousands of children attending the Boston public schools. The character, administrative ability and training of the appointee will inevitably be reflected in the performance of the lunchrooms. It will determine whether or not the children receive maximum value for the money they spend on lunches and whether full use is made of the school-lunch program for teaching nutritive values and for encouraging the children to select the foods that are most wholesome.

A wise choice will redound to the credit of the Boston School Committee.

## MEDICAL EPONYM

### Hashimoto's Struma

While working in the pathology laboratory of Professor E. Kaufmann at Göttingen, Hakaru Hashimoto (b. 1881) published a paper entitled "Zur Kenntniss der lymphomatösen Veränderung der Schilddrüse (Struma lymphomatosa) [On the Recognition of Lymphomatous Change in the Thyroid Gland (Struma Lymphomatosa)]." This paper, published in *Archiv für klinische Chirurgie* (**97**: 219–249, 1912), is based on observations made in the First Surgical Clinic of Professor H. Miyake in Kiushiu, Japan. A portion of the translation follows:

> By the expression "lymphomatous change in the thyroid gland," newly coined by myself, I mean a rank growth of the lymphatic elements with lymph-follicle formation, as well as a certain alteration of the parenchyma and the interstitium, which may be seen in the excised goiter tissue. . . .
>
> The struma lymphomatosa gives, in its advanced stage, a *strikingly solid consistence of the gland*, deceptively resembling a malignant tumor. . . .
>
> Operative therapy results in the disappearance of the tumor, but one must guard against too generous resection. Leaving a portion of the swelling does no harm. In time it will atrophy of itself.

R. W. B.

## MASSACHUSETTS MEDICAL SOCIETY

### DEATH

CARDEN — Charles J. Carden, M.D., of Tewksbury, died July 4. He was in his seventy-first year.

Dr. Carden received his degree from Harvard Medical School in 1896. He was formerly assistant physician at the Tewksbury State Hospital and Infirmary. He was a member of the Massachusetts Medical Society and the American Medical Association.

## MASSACHUSETTS DEPARTMENT OF PUBLIC HEALTH

### LABORATORIES APPROVED FOR PREMARITAL BLOOD TESTS

The list of laboratories below supersedes one published in the January 14, 1943, issue of the *Journal*. Since that time additional laboratories have been approved for performing premarital and prenatal serologic tests for syphilis. The revised list is as follows:

| | |
|---|---|
| Boston | State Wassermann Laboratory |
| | Boston Health Department |
| | Boston Dispensary |
| | Leary Laboratory |
| | Massachusetts General Hospital |
| Brockton | Brockton Health Department |
| Fall River | Truesdale Hospital |
| Holyoke | Providence Hospital |
| Lowell | Lowell General Hospital |
| New Bedford | St. Luke's Hospital |
| Pittsfield | St. Luke's Hospital |
| Springfield | Mercy Hospital |
| Tewksbury | State Infirmary |
| Worcester | St. Vincent's Hospital |
| | Worcester City Hospital |
| | Worcester Department of Health |

Those sending such specimens to laboratories are reminded that no other laboratories in the State are approved for performing these tests.

### EXAMINATION OF THE FEET OF SCHOOL CHILDREN

Chapter 71, Section 57, of the General Laws was amended by the Legislature at its last session by specifically adding feet as an object of examination by school physicians. For over twenty years the physical record forms prescribed by the Department of Public Health and the Department of Education have indicated that the health examination of school children should include items such as general appearance, skin, scalp, posture, teeth, disease of eyes and ears, vision, hearing, throat, nose, lymph nodes, lungs, heart, feet, spine and nervous system. For those school physicians who have been making the required examination, the revision of the law poses no new problems.

Some physicians fear that the law contemplates a detailed orthopedic examination. Such is not the case. The health examination as given in the schools is not, and cannot be, the type of examination given by a physician in his office. The chief purpose is to screen out those children who need a more careful examination by their private physicians.

Examination of the feet is therefore expected to be of the same type as the examination of any other part of the body — sufficient to detect trouble, active or latent, but not necessarily detailed enough for diagnosis.

## BOOK REVIEWS

*Constitution and Disease: Applied constitutional pathology.* By Julius Bauer, M.D. 8°, cloth, 208 pp. New York: Grune and Stratton, 1942. $3.50.

The author has produced an enlightening treatise dealing with the individual constitution and its relation to disease and the differences between normal persons, as well as a delineation of the limits of both the normal and the abnormal. He discusses the similar endocrine disturbances in familial and in various racial groups. He also shows how often identical anatomic malformations show themselves in various branches of a given family. The novice in endocrinology may need the assistance of a good medical dictionary, but to the experienced student of the subject many factors already discussed in textbooks and medical essays are brought together in an instructive manner.

One of the most helpful parts of the book is given to a consideration of the neuroses of organic disease and of patients otherwise normal. The young intern whose training in the symptoms and signs of disease has been acquired in a leading medical school is often thoroughly baffled by his inability to find physical signs of the disease that the patient's subjective symptoms suggest. He is apt to conclude that he is dealing with a malingerer and overlooks the neurotic.

The author discusses very sensibly the question of honesty in medicine and the function of the placebo.

The book should be of interest to all physicians and especially to the young practitioner taking his first view of the varied facets of clinical medicine.

*Treatment of Fractures.* By Guy A. Caldwell, M.D. 8°, cloth, 303 pp., with 92 illustrations. New York: Paul B. Hoeber, Incorporated, 1943. $5.00.

It is refreshing to take up a book on fractures, especially one concerning their treatment, that brings home to the reader the fact that the fundamentals of their management are not so different from what they have always been.

Because operative surgery has been perfected to such a high degree, surgeons have made bold to strive for quicker and more perfect results in the handling of fractures, which has resulted, as is always the case under similar conditions, in the invention of innumerable new gadgets for determining what is the true alignment of the fragments, the best way of bringing them into alignment and the proper method of securing them when the latter has been accomplished. The result has been that from day to day new methods are advocated that, in the discoverer's opinion, revolutionize the treatment of some particular

fracture. It was high time that an authority made such a selection as has the writer of this textbook — that is, one or two practical and efficient methods that have proved to be safe and generally successful for each of the various types.

After adequately outlining the basic principles of dealing with simple and compound fractures, Dr. Caldwell proceeds to deal specifically with the usual types of fracture, illustrating the methods followed with many line drawings.

The possessor of this volume will be spared a great deal of confusion when he attempts to decide from perusal of present-day literature what is the best method to apply in some puzzling case that has turned up in his practice.

## NOTICES

### NEW ENGLAND DERMATOLOGICAL SOCIETY

The regular meeting of the New England Dermatological Society will be held in the Skin Out Patient Department of the Massachusetts General Hospital on Wednesday, October 20, at 2 p.m.

### SALEM TUMOR CLINIC

A teaching clinic will be held at the Salem Hospital on Friday, October 29, at 9 a.m. The speaker will be Dr. Richard B. Cattell, who will discuss certain aspects of "Carcinoma of the Bowel." A member of the staff will present a survey of some of the hospital cases.

Physicians are cordially invited to attend.

### AMERICAN HUMAN SERUM ASSOCIATION

A meeting of the American Human Serum Association will be held at the Children's Hospital, Philadelphia, from 9:30 a.m. to 4:00 p.m. on Friday, October 22, during the war symposium conducted by the American Association of Military Surgeons. A program covering various aspects of shock and its treatment, plasma and blood transfusions, the use of convalescent serums and so forth will be given by authorities in their respective fields. All physicians, particularly those attending the meeting of the American Association of Military Surgeons, will be welcome.

### WINTHROP COMMUNITY HOSPITAL

The monthly staff meeting of the Winthrop Community Hospital will be held on Thursday, October 28, at 9 p.m. at the hospital. Dr. William Dameshek will speak on the subject, "Problems of Hematology of Interest to the General Practitioner."

Physicians, nurses and medical students are cordially invited to attend.

### BOSTON DISPENSARY

A clinical staff meeting of the Boston Dispensary will be held at the Pratt Hospital Auditorium on Friday, October 29, at 12:30 p.m. Dr. John W. Strieder will speak on the subject, "Modern Aspects of Surgery of the Heart." Luncheon will be served at 12 noon.

All interested persons are cordially invited.

## SOCIETY MEETINGS AND CONFERENCES

### Calendar of Boston District for the Week Beginning Thursday, October 21

Thursday, October 21

*9:00–10:00 a.m. Medical clinic. Dr. S. J. Thannhauser. Joseph H. Pratt Diagnostic Hospital.

5:00 p.m. Epidemiologic Factors of Rheumatic Fever. Dr. T. Duckett Jones. Seminar on Diseases of Children. Main amphitheater, Children's Hospital, 300 Longwood Avenue, Boston.

*8:00 p.m. New England Pathological Society. Auditorium of the Boston University School of Medicine.

Friday, October 22

*9:00–10:00 a.m. Some Observations on Heart Murmurs. Dr. Samuel Levine. Joseph H. Pratt Diagnostic Hospital.

Saturday, October 23

*10:00–11:30 a.m. Medical staff rounds. Peter Bent Brigham Hospital.

Monday, October 25

*12:15–1:15 p.m. Clinicopathological conference. Peter Bent Brigham Hospital.

Tuesday, October 26

*9:00–10:00 a.m. Medical clinic. Dr. S. J. Thannhauser. Joseph H. Pratt Diagnostic Hospital.

*12:15–1:15 p.m. Clinicoroentgenological conference. Peter Bent Brigham Hospital.

2:00–4:00 p.m. Myasthenia gravis clinic. Out Patient Department, Massachusetts General Hospital.

Wednesday, October 27

*9:00–10:00 a.m. A Clinical Discussion of Granuloma Inguinale with Differential Diagnosis. Dr. F. M. Thurmon. Joseph H. Pratt Diagnostic Hospital.

*12:00 m. Clinicopathological conference. Children's Hospital.

*Open to the medical profession.

October 20. New England Dermatological Society. Notice elsewhere on this page.

October 21–23. Association of Military Surgeons of the United States. Page x, issue of September 2.

October 22. American Human Serum Association. Notice elsewhere on this page

October 25–30. Postgraduate Courses of the American College of Physicians. Allergy and related topics. Roosevelt Hospital, New York City. Page 570, issue of September 30.

October 28. Winthrop Community Hospital. Notice elsewhere on this page.

October 29. Salem Tumor Clinic. Notice elsewhere on this page.

October 29. Boston Dispensary. Notice elsewhere on this page.

November 8–19. Postgraduate Courses of the American College of Physicians. The course will deal with many aspects of medicine and will be held at various Philadelphia medical institutions. Page 570, issue of September 30.

November 11. Pneumonia as Seen and Treated Today. Dr. Maxwell Finland. Pentucket Association of Physicians. 8:30 p.m. Haverhill.

November 17. New England Oto-Laryngological Society. Page x, issue of October 7.

### District Medical Societies

SUFFOLK

October 27. Page x, issue of October 7.

December 2. Censors' meeting. Page x, issue of September 16.

WORCESTER

November 10. Navy Night. Bancroft Hotel, Worcester.

December 8. Worcester City Hospital.

January 12, 1944. Memorial Hospital, Worcester.

February 9. Worcester State Hospital, Worcester.

March 8. St. Vincent Hospital, Worcester.

April 12. Hahnemann Hospital, Worcester.

May 10. Annual Meeting.